Partners in Progress
PEANUTS

Peanut Research at OSU 2002

Supported by the

Oklahoma Peanut Commission
National Peanut Board

Oklahoma State University
Division of Agricultural Sciences and Natural Resources
Oklahoma Agricultural Experiment Station
Oklahoma Cooperative Extension Service

In cooperation with
U.S. Department of Agriculture - Agricultural Research Service

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Foreword

This publication is the eighth in a series of annual reports from the OSU Division of Agricultural Sciences and Natural Resources summarizing work supported by the Oklahoma Peanut Commission.

In his opening comments, Oklahoma Peanut Commission Executive Secretary Mike Kubicek describes the partnerships used to keep Oklahoma peanut producers viable in an ever changing market place. With these perfect partnerships, growers can rest assured that researchers are working to keep them competitive.

Our *Partners in Progress* series is intended to highlight the most recent significant research and extension activities. With all the work accomplished, it is important to keep in mind that additional research and educational activity needs to come in the future if progress is to continue.

In partnership with the Oklahoma Peanut Commission and the National Peanut Board, we strive to conduct research that is directed toward the needs of the state's producers. This report is just one way in which we communicate results to producers as rapidly as possible.

D.C. Coston, Associate Director
Oklahoma Agricultural Experiment Station
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

Oklahoma State University
Division of Agricultural Sciences and Natural Resources
Mission Statement

The Mission of the Oklahoma State University Division of Agricultural Sciences and Natural Resources is to discover, develop, disseminate, and preserve knowledge needed to enhance the productivity, profitability, and sustainability of agriculture; conserve and improve natural resources; improve the health and well-being of all segments of our society; and to instill in its students the intellectual curiosity, discernment, knowledge, and skills needed for their individual development and contribution to society.

Peanut Production Challenges Reinforce the Perfect Partnership

Mike Kubicek, Executive Secretary
Oklahoma Peanut Commission

> *"And he gave it as his opinion, that whoever could make two ears of corn or two blades of grass grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country,…than the whole race of politicians put together."*
>
> *Jonathan Swift*
> *in Gulliver's Travels*

In 2002, the politicians changed the peanut production landscape with the passage and signing of the New Farm Bill. Farmers questioned, "Why would the U.S. government give up a peanut program that costs zero in taxes to launch a new marketing loan program that will cost taxpayers an estimated $350 million annually?" Secondly, and perhaps most importantly, "Who can afford to produce $355 peanuts in Oklahoma under the new program, when it was tough to make it under the old program at $610?"

Thus the "big challenge" is to maximize yields, while managing inputs, ultimately staying competitive and profitable. Profit or loss has always been a function of yield, price, and cost. All the more reason to reinforce the relationship of producers, the Oklahoma Peanut Commission, USDA, and Oklahoma State University researchers and extension educators – "the perfect partnership."

For almost four decades Oklahoma's peanut producers have financially supported research and extension efforts aimed at improving their profitability and the quality of their product. The resulting technologies, variety development, and management recommendations have annually been published and willingly adopted by producers.

The 2002 version of the Partners in Progress Report should be of interest to every producer since the challenge to remain viable appears to be more critical than ever before. USDA estimated that the 2002 Oklahoma peanut crop set a record per acre yield of 2800 pounds, yet at the same time forecasted the total crop in the state to be the third smallest production in the past forty years. Not reported, of course, was the fact that hundreds of Oklahoma producers opted not to plant last year because of the uncertainty in farming peanuts under the new program.

What will the future hold for Oklahoma peanut producers? We are entering a new era for farmers who are able to be innovative and adopt new technologies for management and marketing strategies. Our USDA and University "peanut team" will continue to provide unbiased research and educational programs under more limited funding and personnel – all challenges for sure.

Many changes have occurred that will continue to challenge the way we produce and market peanuts in the state. Rest assured, our peanut partners will continue to focus on efforts resulting in positive changes to improve Oklahoma's peanut industry.

Peanut Breeding

K. E. Dashiell and B. E. Greenhagen, Plant and Soil Sciences
N. O. Maness, Horticulture and Landscape Architecture
H. A. Melouk, USDA/ARS

2002 progress made possible through OPC support

- Tamrun 96, Tamrun OL 01, Tamrun OL 02, Spanco, and Tamspan 90 continue to be among the best varieties.
- Results from irrigated and dryland trials indicate that varieties can be developed that will give high yields and require fewer irrigations or less water per irrigation.

The major objectives of the peanut breeding project have been to develop high yielding, early maturing peanut cultivars with resistance to Sclerotinia blight and improved post harvest characteristics for Oklahoma. Emphasis is on the development of runner and Spanish market types.

Compared to one year ago, the prices Oklahoma producers received for their 2002 peanut crops were reduced by 34 to 42 percent. Because of this drastic change, caused by the new peanut program that began during 2002, there is an urgent need to find ways to reduce the cost of peanut production.

Improving disease resistance is the major area where the peanut breeding project will be able to reduce the cost of production. This will reduce the cost related to the purchase and application of fungicides to control diseases. A very aggressive research effort is being conducted to identify new breeding lines with higher levels of resistance to Sclerotinia blight and early leaf spot.

Peanut quality continues to be a high priority for the breeding project. The major emphasis is on developing varieties with the high oleic acid trait. This trait gives roasted peanut products a much longer shelf life and also some additional health benefits for consumers when compared to peanuts that do not have the high oleic acid trait. There are indications from the peanut processing industry that they prefer high oleic acid peanuts for most of their products and in a few years they may only purchase peanuts with the high oleic acid trait.

During the 2002 growing season, several peanut breeding trials were conducted at the Caddo Research Station near Ft. Cobb, OK, and the the most important results from these trials are presented in this report. The total rainfall and irrigation for each month is presented in Figure 1. For some of the trials the Total Sound Mature Kernels (TSMK) was multiplied by the yield to get a value called TSMK YLD. This value is an estimate of the relative gross return per acre of each of the entries. Emphasis is on this as a relative value, meaning that it estimates the ranking and relative performance of each entry for gross value.

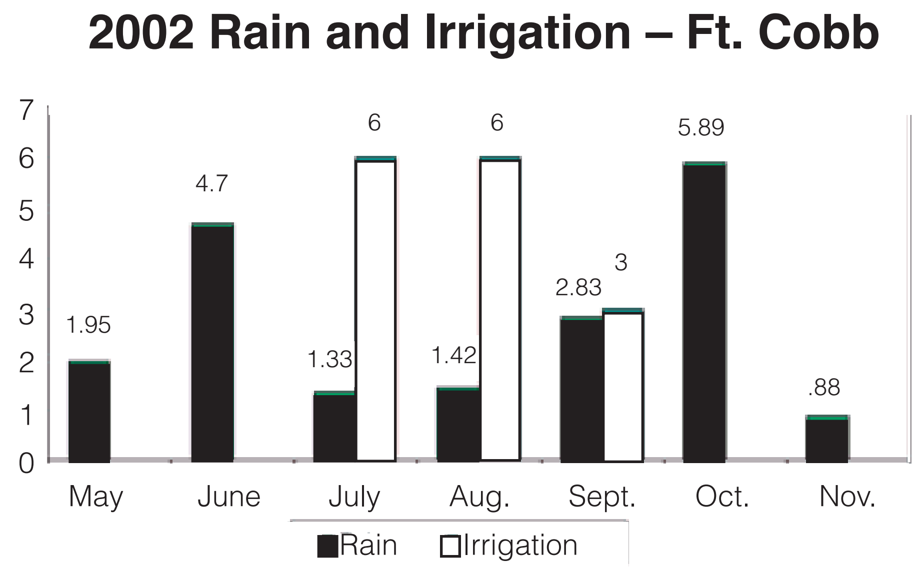

Figure 1. Total rainfall and irrigation for each month at the Caddo Research Station.

The Uniform Peanut Performance Test (UPPT) had 20 breeding lines and five varieties developed by the major peanut breeding projects in the U.S. (Table 1). A randomized complete block design with four replications was used. This trial was irrigated (Figure 1) and had fungicide sprays to control the major diseases. All of the entries in this trial were runners except for Jupiter, VT 9506102-6, and NC 7, which are Virginias because of their large seed size as measured by their seed weight. Tamrun 96, which was the most popular variety planted by farmers in Oklahoma, was the top entry in this trial. An Oklahoma breeding line 8-4-010 and Tamrun OL 01, a variety jointly released in Texas and Oklahoma, also performed well as their yields were not significantly different from Tamrun 96. Tamrun OL 02 did not perform as well as Tamrun 96 or Tamrun OL 01.

All of the breeding lines in the UPPT and other trials in this report that begin with “TX” and the recently released varieties Tamrun OL 01, Tamrum OL 02, and Olin were developed and evaluated by the South West High Oleic Peanut Program (SWHOPP) that is funded by the Texas Peanut Producers Board and the Oklahoma Peanut Commission. The organizations that conduct the research for SWHOPP are the Texas Agricultural Experiment Station, Oklahoma Agricultural Experiment Station, and the United States Department of Agriculture, Agricultural Research Service (USDA-ARS).

There were three advanced trials (Advanced Runner Irrigated 1, Advanced Runner Irrigated 2, and Advanced Spanish Irrigated) conducted during 2002 at Ft. Cobb. Each of these trials was irrigated and had a split-plot design with the fungicide treatment being the main plot and varieties the sub-plot. There were four replications and four different fungicide treatments as described in Table 2.

Table 1. Uniform Peanut Performance Test – Caddo County, 2002.

Entry Name	TSMK YLD (TSMK x Yield)	Yield (lb/A)	Grade (% TSMK)	Seed Weight (g/100 seeds)
Tamrun 96	2987	4029	74.1	62.4
8-4-010	2980	3824	77.8	61.1
Tamrun OL 01	2943	3872	76.0	71.2
Jupiter	2874	3993	71.7	91.6
TX 994336	2888	3920	73.6	61.9
TX 977066	2791	3787	73.7	66.0
8-4-003	2604	3340	77.8	61.2
GA 962533	2548	3654	69.9	60.0
Okrun	2519	3352	75.2	57.3
C156-47	2495	3303	75.7	64.6
TX 977239	2479	3364	73.6	57.0
TX 977116	2473	3279	75.4	61.7
Tamrun OL 02	2465	3388	72.7	59.3
GA 942516	2372	3122	76.1	71.6
GA 962569	2364	3376	70.1	70.3
NC7 X VGP 9 94-2	2295	3061	74.9	56.2
Florunner	2242	3025	74.1	58.3
NC7 X VGP 9 94-4	2166	2952	73.5	55.5
VT 9506102-6	1949	2771	70.3	92.9
TX 966151	1957	2698	72.4	54.5
NC 7	1838	2672	68.5	82.6
UF 98511	1818	2505	71.8	56.9
UF 00620	1761	2456	71.8	60.8
UF 98326	1684	2323	70.8	60.8
C11-2-39	1429	2118	66.8	57.4
LSD 0.05	498	622	4.2	5.5

In the Advanced Runner Irrigated 1 trial the effect of the fungicide treatments (Table 3) were as expected for the disease ratings. When fungicides were applied to control both leaf spot and Sclerotinia there was very little disease; and when fungicides were applied to control leaf spot there was very little leaf spot, but severe Sclerotinia. Also, when fungicides were applied to control Sclerotinia there was very little Sclerotinia, but a moderate level of defoliation caused by leaf spot. When no fungicides were applied Sclerotinia was severe, but leaf spot was moderate. There was no yield gain caused by controlling leaf spot as the no disease control plots averaged 1697 lbs/A and the control leaf spot plots yielded 1719 lbs/A. The yields almost doubled when fungicides were applied to control Sclerotinia as these plots averaged 3395 lbs/A and the plots where all diseases were controlled averaged 3308 lbs/A.

The variety X fungicide treatment interaction was not significant, so the yield and disease results are only given for the average across all four fungicide treatments (Table 4). As in the UPPT trial, Tamrun 96

Table 2. Fugicide spray treatments – Ft. Cobb, 2002.

- No Disease Control – no fungicides
  + SCLEROTINIA*
- Control Leaf Spot – Bravo and Folicur block program
  + SCLEROTINIA
- Control Sclerotinia – Omega
- Control all Diseases – Bravo and Folicur block program plus Omega

* Sclerotinia inoculum was applied to encourage the spread of Sclerotinia blight.

Table 3. Summary of fungicide treatments in the Advanced Runner 1 Irrigated Peanut Performance Trial – Caddo County, 2002.

Treatment Name	Yield (lb/A)	Leaf spot defoliation (%)	Sclerotinia incidence (1-64)	Sclerotinia intensity (1-5)
Control Sclerotinia	3395	20.2	4.9	1.0
Control All Diseases	3008	3.3	10.1	1.2
Control Leaf Spot	1719	0.3	58.2	2.7
No Disease Control	1697	11.5	59.4	2.7
LSD 0.05	501	7.3	8.2	0.5

was the top line for yield. This consistently good performance of Tamrun 96 is impressive. There were only five other varieties that had yields that were not significantly less than Tamrun 96 and they were TX 977006, TX 994313, Southwest Runner, Tamrun OL 01, and Tamrun OL 02. Southwest Runner continues to have the best resistance to Sclerotinia blight, but it also has the most defoliation caused by leaf spot. In this and other trials, we have not identified any breeding lines with relatively good resistance to both leaf spot and Sclerotinia blight. Combining the better leaf spot resistance found in lines such as TX 994313 with the high levels of resistance to Sclerotinia blight

Table 4. Summary of variety performance in the Advanced Runner 1 Irrigated Peanut Performance Trial – Caddo County, 2002.

Treatment Name	Yield (lb/A)	Leaf spot defoliation (%)	Sclerotinia incidence (1-64)	Sclerotinia intensity (1-5)
Tamrun 96	2972	10.9	26.8	1.3
TX 977066	2955	10.3	34.5	1.6
TX 994313	2931	6.9	32.3	1.6
SW Runner	2916	22.5	3.4	1.0
Tamrun OL 01	2819	9.1	34.8	1.9
Tamrun OL 02	2804	13.4	34.0	1.8
UF 00627	2632	10.3	32.5	1.9
8-4-003	2553	5.0	35.4	1.9
UF 98604	2508	8.1	33.4	1.7
UF 99621	2444	8.4	35.5	2.3
94-2	2429	11.3	35.4	1.8
GA 962569	2401	14.1	31.0	1.4
94-4	2363	8.8	34.8	1.9
Okrun	2320	5.6	35.6	2.1
8-4-010	2314	4.7	33.3	1.9
TX 966151	2284	5.9	36.4	1.8
UF 00618	2260	7.5	36.8	2.1
Andru II	2257	5.6	32.4	2.0
GP-1	2143	7.5	36.7	1.9
Florunner	2142	4.7	37.1	2.6
UF 98511	2114	7.5	36.8	2.4
UF 97611	2012	5.0	35.9	2.3
UF 00620	1901	10.0	37.7	2.6
LSD 0.05	285	4.5	3.7	0.4

found in Southwest Runner is an important goal of the breeding project.

The top yielding lines in the Advanced Runner Irrigated 2 trial were Tamrun 96, Tamrun OL 01, Tamrun OL 02, Southwest Runner, and six breeding lines developed by SWHOPP. Florunner, Okrun, and several other breeding lines had poor yields and also were susceptible to Sclerotinia blight.

Spanco was the highest yielding line in the Advanced Spanish Irrigated trial with an average yield across the four fungicide treatments of 3100 lbs/A. The yields for Pronto, Tamspan 90, and Olin were significantly less than Spanco at 2756, 2876, and 1685 lbs/A, respectively.

The varieties in the three Advanced trials were planted in three more trials (Advanced Runner Dryland 1, Advanced Runner Dryland 2, and Advanced Spanish Dryland) with a randomized complete block design, three replications, and no irrigation.

The top six lines in the Advanced Runner Irrigated 1 trial did not yield well in the dryland trial (Table 5). Out of 23 varieties in the trial they ranked 13, 15, 18, 20, 22, and 23 for yield. The six lines that did very well with irrigation and had poor yields without irrigation all were developed in Oklahoma or Texas. In the dryland trial (Table 5), the top four varieties UF 00620, UF 00627, GP-1, and UF 98604 all were developed in Florida. These top four varieties in the dryland were ranked 7, 9, 19, and 23 with irrigation. These very different results that were observed in the dryland and irrigated trials are shown in Figure 2. The three varieties that were developed in Texas and Oklahoma (Southwest Runner, Tamrun OL 01, and Tamrun 96) did well with irrigation, but had a very big yield loss when grown dryland. The three varieties developed in Florida (UF 98511, UF 97611, and UF 00620) were low yielding when irrigated, but had very little yield loss when grown without irrigation.

The results from the Advanced Runner Irrigated 2 and Advanced Runner Dryland 2 trials were similar to those obtained in the Advanced Runner Irrigated and Dryland 1 Trials. Tamrun 96 had one of the highest yields with irrigation and one of the poorest yields without it. Also, the top three yielding varieties in the dryland trial ranked 19, 21, and 22, out of 23 varieties in the irrigated trial.

Table 5. Advanced Runner 1 Dryland Peanut Performance Test – Caddo County, 2002.

Entry Name	TSMK (TSMK x Yield)	Yield (lb/A)	Yield Grade (% TSMK)	Seed Weight (g/100 seeds)
UF 00620	1051.05	2000.53	52.3	40.9
UF 00627	937.75	1581.07	60.0	45.3
GP-1	922.81	1564.93	58.6	42.7
UF 98604	897.53	1645.60	53.6	42.6
NC7 X VGP 9 94-4	886.69	1548.80	57.1	38.9
UF 99621	884.99	1500.40	58.8	48.1
8-4-010	840.19	1500.40	54.9	43.7
NC7 X VGP 9 94-2	835.00	1387.47	60.2	38.7
GA 962569	781.10	1435.87	54.4	51.2
Okrun	772.98	1516.53	50.8	38.3
Tamrun OL 01	771.24	1339.07	57.6	53.6
UF 00618	766.54	1435.87	53.3	45.2
TX 977066	772.03	1371.33	56.4	52.1
UF 98511	753.60	1339.07	56.3	44.2
TX 966151	718.22	1290.67	55.2	41.1
UF 97611	717.53	1403.60	51.2	40.7
TX 994313	705.03	1306.80	54.2	44.3
8-4-003	681.33	1306.80	52.8	41.7
Florunner	596.16	1339.07	43.8	38.9
Andru II	592.40	1129.33	52.1	42.8
SW Runner	506.80	1145.47	44.5	32.4
Tamrun 96	468.82	855.07	54.8	46.2
Tamrun OL 02	417.63	806.67	51.5	48.7
LSD 0.05	250.77	393.62	6.9	5.5

The trial results support conclusions made by Dashiell in his 1979 Oklahoma State University Thesis titled "Genotype X Environment Interaction Studies on Economic Characters of Peanut." He concluded, "When peanuts are grown as a full-season crop different genotypes do not perform consistently between irrigated and dryland locations for percent total sound mature kernels (% TSMK), thus, different cultivars could be selected for irrigated or dryland locations. There is some evidence that different cultivars could be selected for irrigated or dryland locations that have greater pod yield and gross return."

The results described for the Advanced Runner trials and the results from the 1979 Genotype X Environment Interaction study support each other. These results indicate that there is a need to develop different varieties for irrigated and dryland locations in Oklahoma. However, almost all of the experienced peanut producers and peanut research and extension workers think that there will be very little dryland peanut production in Oklahoma's future. Therefore, there is no need to develop varieties for dryland production. However, these results also seem to indicate that we can breed peanut varieties that can give high yields in an environment with less irrigation. There is a need to combine the high yield and disease resistance properties of varieties like Tamrun 96, TX 994313, and Southwest Runner (Table 4) with the ability to have good yields with less water from varieties like UF 00620 and UF 00627 (Table 5).

When the disease resistant varieties that can produce high yields with less irrigation have been developed they will cost less to produce because the irrigation system will not be used as often. Another added benefit will be less disease pressure because the humidity in the crop canopy will be reduced. This should mean that producers can reduce the use of fungicides even more and further reduce the cost of production.

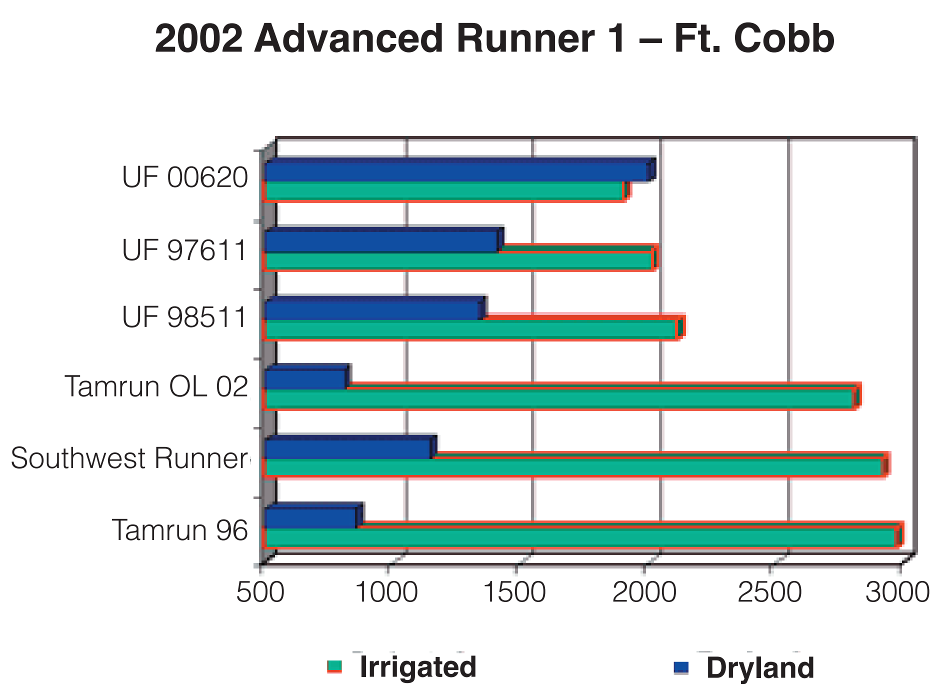

Figure 2. The differences between dryland and irrigated peanut trials.

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Management of Arthropods in Peanuts

P. G. Mulder, S. K. Seuhs, M. T. Stacey, and K. E. Jackson
Department of Entomology and Plant Pathology

2002 progress made possible through OPC support

- Evaluations conducted in ro-till peanuts in 2002, to assess the effects of varying levels of insecticide and fungicide applications on subsequent insect populations revealed few differences in arthropod populations; however, large differences were detected in the level of leafspot infection and subsequent defoliation from the disease.
- Significant differences in yield were recovered between peanuts receiving the maximum number of pesticide treatments and those treated minimally or not at all; however, no differences in yield were recovered between peanuts treated with moderate or minimal amounts of pesticides and untreated plants.
- Studies conducted on two varieties under three variations in tillage practices showed no differences between arthropod populations recovered from either variety; however, some minor differences were observed between tillage practices.
- Between tillage types and varieties, no differences were detected in yield or grade in trials conducted in Eakly, OK.
- Studies conducted on runner type peanuts using two different herbicide approaches and grown in ro-till and no-till systems in Ft. Cobb, OK, revealed no differences in arthropod populations in the two tillage systems; however, more beneficial arthropods were detected in peanuts treated with Valor than in those left weed free.
- Between tillage types and herbicide treatments, no differences were detected in yield or grade for the two herbicide treatments; however, greater yields were obtained in peanuts grown in ro-till systems versus those in no-till.
- A study conducted on Spanish and runner type peanuts to assess the effects of various miticides found a significant advantage to use Kelthane initially; however, all insecticides eventually reduced mite populations similarly and maintained that control until the combination of rains and irrigation confounded the trial.
- After water compromised the efficacy testing, only peanuts treated with Capture witnessed a significant resurgence in mite populations.
- No significant differences in yields were recovered between any of the peanuts treated with miticides or the untreated plants. Likewise, no differences in yields were detected between the various treatments.

Pest Management of Arthropod Populations in Reduced Tillage

Since the advent of the new peanut farm program, it has become imperative to find avenues of reducing inputs into the peanut ecosystem. With this need in mind, in 2002, we began the task of evaluating how the use of varying levels of pesticides (both insecticides and fungicides) could be scaled back in an attempt to reduce production costs, while affording the plants protection from damaging arthropods equal to previously used methods of management. If managing the insects and diseases in a judicious manner, based on insect thresholds and disease advisory alerts, can help in holding down the cost of production with no accompanying yield loss, then this certainly represents an appreciable savings for the grower.

Three experiments at two locations across the major peanut production areas of Oklahoma were conducted to ascertain the effects of varying levels of pesticide inputs and tillage on arthropod and disease pests in Oklahoma.

Comparative Studies on Chemical Inputs in Ro-Till Peanuts

Tables 1 through 6 present the results of varying levels of insecticide and fungicide management on thrips in a ro-till peanut field in Eakly, OK. Runner-type peanuts (variety Tamrun 96) were planted May 21 on the farm of Dr. Roger Musick. Prior to planting, a burndown treatment of Roundup herbicide was applied on May 7 to the existing wheat stubble and volunteer plants (peanut and weeds). Four levels of management were chosen for each plot area to reflect the varying levels of cost and approaches often used by growers. Each plot consisted of peanuts planted four rows wide and 25 ft long. The four treatments were replicated four times. An in-furrow application of Temik was made after planting by using a hand-powered Precision Granular Applicator. Application was made in a 7-inch band, over the open furrow, and calibrated to deliver the prescribed amount of insecticide. The furrow was then covered by hand using a garden hoe. The in-furrow application of Orthene was made with a CO_2 pressurized applicator calibrated to deliver 15 gpa. The post-emergent application of Orthene was applied after 90% emergence on June 6 using a CO_2 wheelbarrow plot sprayer calibrated to deliver 20 gpa. Monitoring for insect populations occurred throughout the season. Initial readings of thrips populations on terminal leaves were conducted 4, 7, 13, and 23 days after treatment (DAT) with the Orthene post-emergent spray. Three subsequent readings were also made on peanut blooms at 36, 43, and 49 DAT. In addition, sweep samples were taken using a standard 15-inch insect sweep net to determine the populations of grasshoppers, defoliating caterpillars, potato leafhoppers, and beneficial arthropods within each treatment area. Near the end of the season, the effects of fungicide treatments on leafspot were measured by estimating the percentage of visible infection and defoliation in each plot area. Finally, yield and grade were determined by digging, combining, drying, and weighing peanuts from the two middle rows of each plot.

Tables 1 and 2 show the effects of insecticides on early-season thrips populations, before fungicides were applied. Populations were relatively low and on only one day (13 DAT) was there any significant differences in infestations in terminal leaves (Table 1). Once the plants began to bloom, significantly more thrips were recovered in peanuts treated with Orthene in-furrow than plants treated with Temik (36 DAT). This scenario occurred again 49 DAT, when differences were also observed between peanuts treated with Orthene in-furrow and those receiving Orthene post-emergent. Irrespective of these differences, populations of thrips remained very light throughout the test period. Sampling conducted later in the season also revealed few differences in other arthropod populations (Tables 3 and 4). No significant differences in populations of grasshoppers or defoliating caterpillars were observed from the two sample dates (Tables 3 and 4, respectively). The peanuts treated with Orthene in-furrow had significantly more potato leafhoppers than those treated with Orthene post-emergent or the untreated plants 92 days after planting (DAP) (Table 3). Approximately 1 ½ weeks later, peanuts treated with Temik had significantly more potato leafhoppers than the untreated plants or those treated with Orthene post-emergent (Table 3). While the numbers of beneficial organisms was similar across all treated and untreated peanuts at 92 DAP, peanuts treated with Orthene in-furrow had significantly more beneficial organisms than the untreated plants at 106 DAP (Table 4).

Large differences were observed in the percentage of leafspot and subsequent defoliation, most likely due to variations in fungicide blocks. The six treatment block had significantly less leafspot and defoliation than all the other treated plants or the untreated plots (Table 5). No differences were observed between the four treatment and two treatment blocks or between either of these approaches and the untreated peanuts (Table 5). The differences seen in defoliation from leafspot also were observed for yield. Yields in peanuts treated with Temik and the six treatment block of fungicides were significantly greater than the untreated plants; however, this difference did not hold up (statistically) between the peanuts treated with the six treatment block and the other treatments (Table 5). Based on grade, yield, and the cost of control, the peanuts receiving the maximum inputs had the greatest return per acre (Table 6) and interestingly, because of the associated costs and lack of yield differences between the four or two block treatments and untreated peanuts, the latter returned more dollars per acre (Table 6).

Table 1. Effect of insecticides on thrips populations in terminal leaves – Musick Farm, Eakly, OK, 2002.*

	Thrips Population[1]			
Treatment/Rate (a.i./A)[2]	4 DAT Total thrips	7 DAT Total thrips	13 DAT Total thrips	23 DAT Total thrips
1) Temik 15G/1.0 lb	10.3 a	3.8 a	1.0 ab	2.0 a
2) Orthene 75S IF/0.50 lb	5.3 a	2.3 a	2.3 a	0.5 a
3) Orthene 75S Post/0.50 lb	4.3 a	5.4 a	0.5 b	1.8 a
4) Untreated	6.5 a	3.8 a	2.0 ab	2.3 a

DAT = Days after treatment (Orthene-post).

* Means, within columns, followed by the same letter are not significantly different (P=0.05; LSD).

1 Thrips populations represent a mean of the total (adults and larvae) sampled from 5 leaves/plot.

2 Temik and Orthene IF were applied at plant, in furrow. Orthene 75S post was applied as a postemergence spray on June 6, 2002.

Table 2. Effect of insecticides on thrips populations in blooms – Musick Farm, Eakly, OK, 2002.*

	Thrips Population[1]		
Treatment/Rate (a.i./A)[2]	36 DAT Total thrips	43 DAT Total thrips	49 DAT Total thrips
1) Temik 15G/1.0 lb	4.0 b	7.0 a	4.8 bc
2) Orthene 75S IF/0.50 lb	8.3 a	6.8 a	8.5 a
3) Orthene 75S Post/0.50 lb	5.3 ab	5.8 a	3.5 c
4) Untreated	6.3 ab	6.8 a	7.3 ab

DAT = Days after treatment (Orthene-post).
* Means, within columns, followed by the same letter are not significantly different (P=0.05; LSD).
1 Thrips populations represent a mean of the total (adults and larvae) sampled from 5 blooms/plot.
2 Temik and Orthene IF were applied at plant, in furrow. Orthene 75S post was applied as a postemergence spray on June 6, 2002.

Table 3. Effect of pesticides on grasshopper and potato leafhopper populations in ro-till peanuts – Musick Farm, Eakly, OK, 2002.*

	Grasshoppers[1]		Potato Leafhoppers[1]	
Treatment/Rate (a.i./A)[2]	92 DAP	106 DAP	92 DAP	106 DAP
1) Temik 15G/1.0 lb	3.0 a	3.5 a	8.5 ab	20.0 a
2) Orthene 75S IF/0.50 lb	2.5 a	3.5 a	14.0 a	12.3 ab
3) Orthene 75S Post/0.50 lb	2.5 a	3.8 a	6.8 b	6.8 b
4) Untreated	3.8 a	3.0 a	6.0 b	10.3 b

DAP = Days after planting.
* Means, within columns, followed by the same letter are not significantly different (P=0.05; LSD).
1 Insect populations represent a mean of the total (adults and nymphs) sampled from 4 sweeps/plot.
2 Temik and Orthene IF were applied at plant, in furrow. Orthene 75S post was applied as a postemergence spray on June 6, 2002.

Table 4. Effect of pesticides on defoliating caterpillars and beneficial arthropod populations in ro-till peanuts – Musick Farm, Eakly, OK, 2002.*

	Defoliating Caterpillars[1]		Beneficial Arthropods[1]	
Treatment/Rate (a.i./A)[2]	92 DAP	106 DAP	92 DAP	106 DAP
1) Temik 15G/1.0 lb	3.5 a	0.5 a	1.5 a	3.0 ab
2) Orthene 75S IF/0.50 lb	3.0 a	0.8 a	2.8 a	3.8 a
3) Orthene 75S Post/0.50 lb	3.3 a	0.8 a	2.0 a	2.8 ab
4) Untreated	2.5 a	2.3 a	1.8 a	1.0 b

DAP = Days after planting.

* Means, within columns, followed by the same letter are not significantly different (P=0.05; LSD).

[1] Insect populations represent a mean of the total (adults and nymphs) sampled from 4 sweeps/plot. Defoliating caterpillars include corn earworm, beet armyworm, loopers, etc. Beneficial arthropods include spiders, damsel bugs, big-eyed bugs, red-cross beetles, etc.

[2] Temik and Orthene IF were applied at plant, in furrow. Orthene 75S post was applied as a postemergence spray on June 6, 2002.

Table 5. Effect of insecticides and varying levels of fungicides on percent of peanut leaf spot, percent of subsequent defoliation, and yield – Musick Farm, Eakly, OK, 2002.*

Treatment/Rate (a.i./A)	% Leafspot	% Defoliation	Yield (lbs/A)
Temik 15G/1.0 lb+ 6 TRT block[1]	10.0 a	1.3 a	4337.9 a
Orthene 75S IF/0.50 lb+ 4 TRT block[2]	56.3 b	21.3 b	3575.5 ab
Orthene 75S Post/0.50 lb+ 2 TRT block[3]	50.0 b	23.8 b	3639.1 ab
Untreated	78.7 b	57.5 b	3257.9 b

DAP = Days after planting.

* Means, within columns, followed by the same letter are not significantly different (P=0.05; LSD).

[1] Six treatment block consists of 1st application of Bravo (45 DAP), followed by 2nd application of Abound 14 days later, followed by 3rd application of Bravo 14 days later, followed by 4th apllication of Abound 14 days later, followed by 5th and 6th applications of Bravo two weeks apart and 14 days after the 4th application.

[2] Four treatment block consists of 1st application of Bravo (45 DAP), followed by 2nd and 3rd application of Abound at 60 and 90 DAP, respectively, followed by 4th application Bravo three weeks later.

[3] Two treatment block consists of 1st and 2nd applications of Abound at 60 and 90 DAP.

Table 6. Effect of insecticides applied for thrips and fungicides applied for disease control on peanut grade, value, and return per acre – Eakly, OK, 2002.

Treatment/Rate (a.i./A)	Mean Grade (% TSMK)	Mean Value ($/A)	Cost ($/A)[1]	Return ($/A)[2]
Temik 15G/1.0 lb+ 6 TRT block	73	765.37	130.59	634.78
Orthene 75S IF/0.50 lb+ 4 TRT block	73.5	634.50	94.79	539.71
Orthene 75S Post/0.50 lb+ 2 TRT block	73	640.53	75.58	564.95
Untreated	74.5	581.03	0	581.03

1 Treatment costs = Cost of insecticide only for at-plant applications (Temik and Orthene IF); for Orthene post applied: cost = insecticide cost ($7.40) + application cost ($3.00). Bravo1.5 pts/A = $9.60, Abound 18.4 fl.oz./A = $32.59,

2 Partial return = crop value - treatment costs.

Effects of Tillage Pratices on Seasonal Arthropod Populations

Information found in Tables 7 to 21 present the results from monitoring the pest and beneficial arthropod complex throughout the season at two locations in Oklahoma. Thrips, defoliating caterpillars, leafhoppers, and grasshoppers were monitored similarly to the previous test. No insecticides were applied throughout this test. In the Eakly location, thrips were monitored within terminal leaves 20, 23, 29, and 34 DAP (Tables 7 and 8). These insects were also monitored in peanut blooms 36, 43, and 49 DAP (Table 9). Defoliating caterpillars, grasshoppers, potato leafhoppers, and beneficial arthropods were all monitored 92 and 106 DAP (Tables 10 to 13, respectively). Yield and grade results are presented in Table 14. In the Ft. Cobb location, thrips populations within terminal leaves were monitored 28, 32, 38, and 48 DAP (Tables 15 and 16). Thrips populations were also monitored within blooms 61 and 68 DAP (Table 17). Defoliating caterpillars, grasshoppers, potato leafhoppers, and beneficial arthropods were monitored 100 and 114 DAP (Tables 18 to 21). The effects of tillage and herbicide treatments on yield and grade are presented in Table 22.

Throughout the trial conducted in Eakly, no differences in arthropod populations, yield, or grade were detected between the two varieties of peanuts. Thrips populations were similar in terminals and blooms during each sampling period with the exception of those recovered from conventional tillage at the Eakly location 23 DAP. On this sampling date, significantly more thrips were recovered in peanuts planted within conventional tillage than in plants grown within a ro-till situation (Table 7). Defoliating caterpillars, grasshoppers, and potato leafhopper populations were statistically similar in all tillage and herbicide treatments at both locations. At both locations, no significant differences were detected in the beneficial arthropod populations in any of the tillage practices (Table 13). At Ft. Cobb, significantly more beneficial arthropods were recovered in peanuts receiving the Valor herbicide treatment than in those grown in a weed free environment (Table 21).

Based on results of yield analysis, no significant differences in yield and grade were detected between peanuts grown under any of the three tillage practices at the Eakly location (Table 14). At Ft. Cobb, significantly greater yields were obtained in peanuts grown within ro-till systems than in no-till (Table 22). No other yield or grade differences were detected at this location (Table 22).

Table 7. Effects of tillage practices on thrips populations – Musick Farms, Eakly, OK, 2002.*

	Mean No. Thrips /10 Quadrifoliate leaves					
	20 DAP Variety			23 DAP Variety		
Tillage	TR96	TROL01	Mean	TR96	TROL01	Mean
No-Till	25.3	37	31.2 a	12.3	14	13.2 a
Ro-Till	44	45	44.7 a	10.7	12	11.3 a
Conv.-Till	50	50.7	50.3 a	23.7	18.7	21.2 b
Mean	40 a	44 a		16 a	14 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 8. Effects of tillage practices on thrips populations – Musick Farms, Eakly, OK, 2002.*

	Mean No. Thrips /10 Quadrifoliate leaves					
	29 DAP Variety			34 DAP Variety		
Tillage	TR96	TROL01	Mean	TR96	TROL01	Mean
No-Till	6.7	8.7	7.7 a	2.3	3.0	2.2 a
Ro-Till	4.7	10.0	7.3 a	1.3	3.3	2.3 a
Conv.-Till	4.0	7.7	5.8 a	2.6	1.7	2.2 a
Mean	5.1 a	8.8 a		2.1 a	2.5 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 9. Effects of tillage practices on thrips populations in blooms – Musick Farms, Eakly, OK, 2002.*

	Mean No. Thrips /10 Blooms								
	36 DAP Variety			43 DAP Variety			49 DAP Variety		
Tillage	TR96	TROL01	Mean	TR96	TROL01	Mean	TR96	TROL01	Mean
No-Till	9.7	10	9.8 a	12.7	11.3	12.0 a	15.7	19.7	17.7 a
Ro-Till	15	9	12.0 a	7.3	10.3	8.8 a	22.7	21	21.8 a
Conv. Till	11.7	12.7	12.2 a	9	8.3	8.7 a	18	17	17.5 a
Mean	12.1 a	10.6 a		9.7 a	10.0 a		18.8 a	19.2 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 10. Effects of tillage practices on defoliating caterpillar populations – Musick Farms, Eakly, OK, 2002.*

	Mean No. Defoliators /10 Sweeps					
	92 DAP Variety			106 DAP Variety		
Tillage	TR96	TROL01	Mean	TR96	TROL01	Mean
No-Till	2.0	1.0	1.5 a	1.0	0.0	0.5 a
Ro-Till	1.0	2.3	1.7 a	1.3	0.0	1.2 a
Conv.-Till	2.0	1.0	1.5 a	1.0	1.3	1.2 a
Mean	1.7 a	1.4 a		1.1 a	0.4 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 11. Effects of tillage practices on grasshopper populations – Musick Farms, Eakly, OK, 2002.*

	Mean No. Grasshoppers /10 Sweeps					
	92 DAP Variety			106 DAP Variety		
Tillage	TR96	TROL01	Mean	TR96	TROL01	Mean
No-Till	3.3	3.7	3.5 a	2.7	3.7	3.2 a
Ro-Till	3.7	4.3	4.0 a	4.7	5.7	5.2 a
Conv.-Till	4.3	2.0	3.2 a	5.3	2.0	3.7 a
Mean	3.8 a	3.3 a		4.2 a	3.8 a	

DAP = Days after planting.

* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 12. Effects of tillage practices on potato leafhopper populations – Musick Farms, Eakly, OK, 2002.*

	Mean No. Leafhoppers /10 Sweeps					
	92 DAP Variety			106 DAP Variety		
Tillage	TR96	TROL01	Mean	TR96	TROL01	Mean
No-Till	11.7	10.3	11.0 a	31.7	16.3	24.0 a
Ro-Till	9.3	6.0	7.3 a	20.0	22.3	21.2 a
Conv.-Till	11.0	16.3	13.7 a	26.0	37.3	31.7 a
Mean	10.7 a	10.9 a		25.0 a	25.3 a	

DAP = Days after planting.

* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 13. Effects of tillage practices on beneficial arthropod populations – Musick Farms, Eakly, OK, 2002.*

	Mean No. Beneficials/10 Sweeps					
	92 DAP Variety			106 DAP Variety		
Tillage	TR96	TROL01	Mean	TR96	TROL01	Mean
No-Till	1.0	1.7	1.3 a	2.7	2.7	2.7 a
Ro-Till	1.7	1.0	1.3 a	3.7	0.7	2.2 a
Conv.-Till	2.3	3.0	2.7 b	1.3	2.0	1.7 a
Mean	1.7 a	1.9 a		2.6 a	1.8 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 14. Effects of tillage practices on peanut variety yield and grade – Musick Farms, Eakly, OK, 2002.*

Tillage System	Variety	Yield (lb/A) Tillage	Yield (lb/A) Variety	Grade (%TSMK)[1]	Grade (%TSMK)[1]
Conv.- Till		3540 a		76 ab	
	Tamrun 96		3555 a		76 a
	Tamrun OL 01		3525 a		77 a
Ro- Till		3079 a		77 a	
	Tamrun 96		2921 a		76 a
	Tamrun OL 01		3237 a		77 a
No-Till		3037 a		75 b	
	Tamrun 96		2950 a		75 a
	Tamrun OL 01		3125 a		76 a

* Means, within columns, followed by the same letter are not significantly different (P=0.05; LSD).
[1] %TSMK = % Total Sound Mature Kernels.

Table 15. Effects of tillage practices on thrips populations in terminals of seedling peanuts – Repp Farms, Ft. Cobb, OK, 2002.*

	Mean No. Thrips/10 Quadrifoliate leaves					
	28 DAP			32 DAP		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	19.8	23.5	21.6 a	10.5	12.8	11.6 a
Ro-Till	17.5	22.3	19.9 a	6.5	6.3	6.4 a
Mean	18.6 a	22.9 a		8.5	9.5	

DAP = Days after planting.

* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 16. Effects of tillage practices on thrips populations in terminals of seedling peanuts – Repp Farms, Ft. Cobb, OK, 2002.*

	Mean No. Thrips /10 Quadrifoliate leaves					
	38 DAP			48 DAP		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	12.3	7.5	9.9 a	18.8	9.8	14.3 a
Ro-Till	9.8	8.3	9.0 a	16.5	22.5	19.5 a
Mean	11.0 a	7.9 a		17.6 a	16.1 a	

DAP = Days after planting.

* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 17. Effects of tillage practices on thrips populations in blooms – Repp Farms, Ft. Cobb, OK, 2002.*

	Mean No. Thrips/10 Blooms					
	61 DAP			68 DAP		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	32.3	27.0	29.6 a	17.0	20.8	18.9 a
Ro-Till	27.0	26.3	26.6 a	17.8	13.3	15.5 a
Mean	29.6 a	26.6 a		17.4 a	17.0 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 18. Effects of tillage practices on defoliating caterpillar populations in peanuts – Repp Farms, Ft. Cobb, OK, 2002.*

	Mean No. Defoliators/10 Sweeps					
	100 DAP			114 DAP		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	1.5	0.0	0.8 a	0.5	0.0	0.3 a
Ro-Till	0.3	1.3	0.8 a	0.3	0.0	0.1 a
Mean	0.9 a	0.6 a		0.4 a	0.0 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 19. Effects of tillage practices on grasshopper populations in peanuts – Repp Farms, Ft. Cobb, OK, 2002.*

	Mean No. Grasshoppers/10 Sweeps					
	100 DAP			114 DAP		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	3.5	3.8	3.6 a	1.5	2.3	1.9 a
Ro-Till	2.5	1.0	1.8 a	1.0	1.0	1.0 a
Mean	3.0 a	2.4 a		1.2 a	1.6 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 20. Effects of tillage practices on potato leafhopper populations in peanuts – Repp Farms, Ft. Cobb, OK, 2002.*

	Mean No. Leafhoppers/10 Sweeps					
	100 DAP			114 DAP		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	23.3	12.5	17.9 a	17.8	25.3	21.5 a
Ro-Till	25.8	14.3	20.0 a	25.8	16.5	21.1 a
Mean	24.5 a	13.4 a		21.8 a	20.9 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 21. Effects of tillage practices on beneficial arthropod populations in peanuts – Repp Farms, Ft. Cobb, OK, 2002.*

	Mean No. Beneficials /10 Sweeps					
	100 DAP			114 DAP		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	2.5	0.3	1.4 a	2.3	3.3	2.8 a
Ro-Till	3.5	0.5	2.0 a	3.5	3.5	3.0 a
Mean	3.0 a	0.4 b		2.9 a	3.4 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Table 22. Effects of tillage practices on yield and grade of peanuts – Repp Farms, Ft. Cobb, OK, 2002.*

	Yield (lbs/A)			Grade (% TSMK)		
Tillage	Valor/ 32 oz Pre	Weed Free	Mean	Valor/ 32 oz Pre	Weed Free	Mean
No-Till	5191	5133	5162 a	73	74	73.5 a
Ro-Till	5293	5685	5489 b	76	77	76.5 a
Mean	5242 a	5409 a		74.5 a	75.5 a	

DAP = Days after planting.
* Overall means, within either tillage or variety, followed by the same letter are not significantly different (P= 0.05; ANOVA).

Miticide Evaluation Studies

Six chemical miticides were evaluated for efficacy in controlling TSSM in peanuts. One portion of a five acre field was selected because of uniform infestation by TSSM. The field selected was planted in two strips on 36-inch rows on May 7. The two strips of peanuts consisted of alternating rows of Spanish (Tamspan 90) and runner (Tamrun 96) type peanuts. Management practices in the designated area were modified to increase mite populations. These practices included application of Lorsban 15G (2 lb AI/A) on July 9 and one application each of Asana (0.035 lb AI/A) and Orthene (0.5 lb AI/A) on July 17 and 24, respectively. Following an application of Orthene, irrigation was suspended to further accentuate mite populations. The selected area became heavily and uniformly infested with mites. Plots were arranged within the area in a split-plot design with six replicates. Each plot was 25 ft long by four rows wide and consisted of two rows each of Spanish and runner type peanuts. Five applications of foliar fungicides were made to the plot area to prevent disease related problems (leaf spot and southern blight). Miticide treatments were applied on August 15 using a CO_2-pressurized bicycle sprayer calibrated to deliver 20 gpa at 22 psi through seven 11004 flat fan nozzles when traveling at 3 mph. Pretreatment counts were taken in each plot on August 15 just prior to application. Post-treatment counts were made on August 19, 22, 29 and September 4 or 4, 7, 14, and 20 DAT, respectively. Treatments were evaluated by comparing mite control on 10 randomly selected plants per plot. Population densities of mites were estimated by sampling an area of 0.35 in^2 (2.25 cm^2) on each plant. Yields were determined by digging, combining, drying, and weighing peanuts from all rows of each plot. Data were analyzed using ANOVA and LSD procedures.

Weather conditions for the first seven days after treatment were good for activity of mites with no rainfall and a mean daily high temperature of 95.9° F. Seven DAT the irrigation system was restarted because the first half of August was so dry, and plants began to suffer (to the point of dying). The following day, the site received 1.28 inches of rain. The combination of irrigation and rainfall helped plants recover, but nearly eliminated mites across the entire area, with some exceptions. The only miticide that exhibited significantly fewer mites 4 DAT was Kelthane (Table 23). By 7 DAT, all chemically treated peanuts had significantly fewer mites than the untreated plants. In addition, no significant differences in mite populations were observed between any of the treatments (Table 23). Throughout the first week, significantly more mites were recovered in runner type peanuts than in Spanish types (Table 23). After irrigation and subsequent rains both peanut types had similar mite populations until the final sampling period. Irrigation and/or rainfall, generally prevents mite populations from building up in peanuts. This is quite obvious based on results obtained in this trial after the heavy rainfall and irrigation (14 DAT and beyond), particularly in the untreated plots. The one exception to this scenario was the peanuts treated with Capture. Mite populations in these peanuts maintained a high population level and actually increased during the final two sampling periods (Table 23). These high mite populations were significantly greater than any of the other peanuts receiving a chemical treatment, as well as the untreated plants. No significant differences in yield were detected between any of the whole plot (chemicals) or split plot (peanut type) treatments.

Table 23. Effect of miticides on mite populations in runner and Spanish peanuts – Perkins, OK, 2002.

Treatment/ Formulation	Rate lb. AI/A	Pre-Treatment Aug 15	4 DAT Aug 19	7 DAT Aug 22	14 DAT Aug 29	20 DAT Sept 4	29 DAT Sept 13	Yield Lbs/A*
Aramite/4L	0.375	151.5 a	130.3 a	12.9 a	0.2 a	0.0 a	0.0 a	1986.7 a
Aramite/4L	0.5	144.8 a	101.8 a	8.8 a	0.3 a	0.1 a	1.5 a	1937.5 a
Comite/ 6.5EC	1.63	168.0 a	110.3 a	8.1 a	1.3 a	1.6 a	4.9 a	1866.0 a
Capture/2EC	0.08	168.3 a	120.0 a	21.2 a	18.1 b	59.7 b	138.2 b	1800.5 a
Kelthane/MF	0.75	178.8 a	19.3 b	15.3 a	5.2 a	3.3 a	1.9 a	1969.8 a
Untreated	----	162.2 a	136.6 a	132.1 b	4.2 a	2.8 a	0.5 a	1652.8 a
Peanut Type Mean								
Spanish		140.1 a	91.1 a	18.9 a	4.6 a	10.1 a	18.7 a	1810.1 a
Runner		184.4 b	114.9 b	47.3 b	5.1 a	12.4 a	30.3 b	1928.3 a

DAT = Days after treatment.

* Whole plot (chemical) and split plot (peanut type) means, within the same column followed by the same letter are not significantly different (ANOVA; LSD; P=0.05).

Field Studies for the Control of Peanut Diseases

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2002 progress made possible through OPC support

- Tamrun 96 continued to be the most profitable variety where Sclerotinia blight is a problem, while Tamspan 90 continues to have the best resistance.

- The new runner varieties Tamrun OL 01 and Georgia Hi O/L showed moderate resistance to Sclerotinia blight and were more productive than Okrun, but not Tamrun 96.

- Disease control and yield responses to Omega and Endura (BAS 510) fungicides for control of Sclerotinia blight were less than in previous years because of the extended wet weather in the fall, which delayed harvest.

- Performance of Endura (BAS 510), a new fungicide for Sclerotinia blight, was inconsistent. Disease control with Endura was better when applications were made later in the season than recommended by the manufacturer.

- Except where Sclerotinia blight was a problem, yield responses to fungicide programs generally resulted from the control of early leaf spot. Yield increases from fungicide programs were documented in far southwestern Oklahoma for the first time as a result of leaf spot control.

- Compared to full-season programs using six applications, adequate control of early leaf spot, but not southern blight, resulted from reduced numbers of fungicide applications. Yield loss from early leaf spot was prevented using reduced fungicide programs that were based on the calendar and the early leaf spot advisory program.

- Headline, a new fungicide that will be available in 2003, was particularly effective against leaf spot in reduced fungicide programs.

- As a result of the reduced value of peanuts under the new farm program, economic returns from fungicide programs were less than in previous years.

Eleven field trials were completed in 2002 that addressed the major peanut diseases growers face. Management strategies that were evaluated included chemical control, disease resistant varieties, and tillage. Efforts were made to develop and demonstrate a range of input levels for the disease management programs. Diseases studied included early leaf spot, pepper spot, southern blight, Sclerotinia blight, limb rot, and pod rot. Cooperation in these studies was provided by Ron Sholar and Jerald Nickels, Department of Plant and Soil Sciences; Phil Mulder, Department of Entomology and Plant Pathology; and Hassan Melouk, USDA/ARS in Stillwater. Appreciation is expressed to Gary Weger (Bryan County), Matt Meuller (Jackson County), and Roger Musick (Caddo County), who provided time and resources as on-farm cooperators for some of the trials. Bobby Weidenmaier, Jerry Howell, and Mike Brantes at the Caddo Research Station also are acknowledged for their valuable support and cooperation that made the trials at the research station a success.

The studies on disease management in 2002 served several purposes. The first was to identify and refine better strategies for managing diseases. The second was to use the trials sites as demonstrations to show growers firsthand the benefits of disease management in peanut production. Trial sites in Bryan and Caddo counties were showcased during annual fall field tours. Results are summarized in this report. In interpreting the results, small differences in treatment values should not be overemphasized. Least significant difference (LSD) values are shown at the bottom of most tables. Unless two values differ by at least the LSD value shown, little confidence can be placed in the superiority of one treatment or variety over another.

In 2002, weather was generally favorable for the development of peanut diseases. Weather also was favorable for peanut production as most areas of the state received timely rains. Leaf spot appeared in most production areas of the state in June and July. Conditions remained favorable for leaf spot throughout most of the growing season. Levels of southern blight and limb rot were below normal in 2002 and did not become severe until September. Sclerotinia blight appeared in August and increased moderately until October. During October when the bulk of the state's peanut acreage was harvested, cool rainy weather prevailed statewide. The wet conditions prevented harvest until November when frost, foliar diseases, and Sclerotinia blight had become severe. Trials in Jackson, Payne, and Caddo counties were harvested before the wet weather in the fall. Yields in these trials were high and only moderate damage from diseases occurred. Trials at the Caddo Research Station and in Bryan County were not harvested until November.

Sclerotinia Blight

Sclerotinia blight remains a destructive disease in Oklahoma. It occurs in all areas of the state except in far southwestern production areas. Trials on management of Sclerotinia blight were conducted at the Caddo Research Station. The trials were focused on evaluating fungicides and varieties, developing efficient fungicide programs, and determining the response of specific varieties to fungicide programs.

Evaluation of Fungicides and Varieties

Fungicide treatments applied to the susceptible variety Okrun were compared to untreated runner varieties and Tamspan 90, a resistant Spanish variety. Runner varieties included Tamrun 96 and Tamrun OL 01, which have shown moderate resistance and improved yields where Sclerotinia blight is a problem. Fungicide treatments consisted of preventive and demand applications of Omega.

Disease pressure was severe in this trial as it was harvested over two months after the last fungicide application (Table 1). Of the fungicide treatments applied to Okrun, Omega applied preventively at 1.5 pt/A twice and a single application at 2 pt/A reduced Sclerotinia blight compared to the check (untreated Okrun). A single application of Omega at 1 pt/A was not effective. Among the varieties not treated with fungicide, Tamspan 90 showed excellent disease resistance, while AT1-1 was as susceptible as Okrun. Tamrun 96 and Georgia Hi O/L showed the best resistance of the runner varieties. Yield was increased above the Okrun check for all Omega treatments except the single application at 1 pt/A. Compared to the Okrun check, yield increases for effective Omega treatments exceeded 1500 lb/A and for all varieties except AT1-1 exceeded 1000 lb/A. However, because of the severe disease pressure, yields of the resistant varieties were below 3000 lb/A. Because of the high costs of Omega and the reduced value of peanuts in 2002, returns ($/A) were similar among the Omega treatments and the resistant varieties.

Evaluation of Endura (BAS 510)

Endura is an experimental fungicide that has been tested at the Caddo Research Station since 1998 for control of

Table 1. Control of Sclerotinia blight with fungicides or resistant varieties – Caddo Research Station, 2002.

Variety-Treatment & rate/A (no. applications)	Sclerotinia blight (%)	Yield (lb/A)	Value ($/A)	Cost ($/A)[1]	Return ($/A)[2]
Okrun-Omega 4F 1 pt (1)	83	1844	340	48	292
Okrun-Omega 4F 2 pt (1)	30 *	3057 *	564	93	471
Okrun-Omega 4F 1.5 pt (2)	18 *	3420 *	631	141	490
Tamspan 90-check	4 *	2722 *	484	0	484
Tamrun 96-check	31 *	2701 *	469	0	469
Tamrun OL-01-check	69 *	2635 *	469	0	469
Georgia Hi O/L - check	15 *	2744 *	475	0	475
AT 1-1 - check	99	1641	288	0	288
Okrun-check	97	1336	244	0	244
LSD (P=0.05)[3]	22	510			

1 Treatment cost = cost of fungicide for Sclerotinia blight (Omega=$45/pt) + $3/A for application costs.
2 Partial return = (crop value based on grade) - (treatment cost).
3 Least significant difference. Values followed by an asterisk (*) are significantly different from the untreated Okrun check at P=0.05.

Sclerotinia blight. Registration on peanuts is expected as soon as 2003. The fungicide also controls early leaf spot. In previous trials, its performance had been similar to that of Omega. In 2002, the effectiveness of Endura was tested alone and in combination with Omega.

Pressure from Sclerotinia blight was severe in this trial as infection was near 100% and yields were below 2000 lb/A for the untreated check (Table 2). All fungicides except Omega alone reduced levels of disease compared to the untreated check. Omega alternated with Endura provided the best disease control. All treatments increased yields compared to the check. Yield increases ranged from 700 lb/A for the Endura and Omega programs, to over 1500 lb/A for Endura alternated with Omega. Overall, Endura and Omega were less effective than in previous trials at this site. Disease control was excellent when the treatments were evaluated in September. However, because the trial was harvested more than two months after the last application, the disease increased dramatically during the wet weather in October.

Variety Response to Fungicide Programs for Sclerotinia Blight

Promising runner varieties were grown with and without fungicide treatment for Sclerotinia blight. Varieties included Tamrun 96, Tamrun OL 01, Georgia Green, Georgia Hi O/L, and AT1-1. Tamrun 96 and Tamrun OL 01 have previously shown moderate resistance. Georgia Green has been intermediate in reaction, while Georgia Hi O/L and AT1-1 are new releases. These were compared to Okrun, a susceptible runner variety, and Tamspan 90, a resistant Spanish variety. Plots of each variety were left untreated, received a single application of Omega at 2 pt/A made on demand, and two or three preventive applications of Endura (BAS 510) on three week intervals.

Levels of Sclerotinia blight were severe in this trial as evidenced by the near 100% infection level and yield below 2000 lb/A for the untreated Okrun check (Table 3). Levels of disease in untreated check plots ranged from only 6% for Tamspan 90 to 99% for AT1-1. For the runner varieties, Tamrun OL 01 and Tamrun 96 showed

Table 2. Evaluation of Endura (BAS 510) for control of Sclerotinia blight in the peanut variety Okrun – Caddo Research Station, 2002.

Treatment & rate/A (no. applications)	Sclerotinia blight (%)	Yield (lb/A)	Value ($/A)
Endura 70WG 9.1 oz (2)	67 *	2163 *	391
Endura 70WG 9.1 oz (3)	49 *	2185 *	395
Endura 70WG 9.1 oz (2) + Omega 4F 1 pt (2)	29 *	3282 *	593
Omega 4F 1 pt (3)	87	2243 *	403
check	96	1445	261
LSD (P=0.05)[1]	16	427	

[1] Least significant difference. Values followed by an asterisk (*) are statistically different from the untreated check at P=0.05.

the best resistance, while Georgia Hi O/L, AT1-1, and Okrun were most susceptible. Yield increases above Okrun for untreated plots ranged from 1000 lb/A for Georgia Hi O/L and Tamrun OL 01, to more than 1500 lb/A for Tamrun 96.

Fungicide programs reduced disease levels on all varieties except Tamspan 90 and Tamrun 96. Generally, all spray programs reduced levels of Sclerotinia blight on the other varieties. Of the fungicide programs, three applications of Endura provided the best control. Fungicide programs increased yields compared to the untreated check for all varieties except Tamspan 90, Tamrun 96, and Tamrun OL 01. Yield responses to fungicide programs were greatest for Okrun, Georgia Hi O/L, and AT1-1. Crop values ($/A) for untreated plots were improved over Okrun for all varieties except AT1-1 and was greatest for Tamrun 96. Partial returns (crop value less the treatment cost) could only be determined for Omega because the future cost of Endura was unknown. Omega, which costs $93/A, returned more than $100/A only for Okrun, Georgia Hi O/L, and AT1-1. Results demonstrated the importance of planting improved varieties were Sclerotinia blight is a problem.

Table 3. Responses of peanut varieties to fungicide programs for control of Sclerotinia blight – Caddo Research Station, 2002.

Treatment & rate/A (no. applications)[1]	Okrun	Tamspan 90	Tamrun 96	Tamrun OL 01	Georgia Green	Georgia Hi O/L	AT 1-1
Disease incidence (%)							
Omega 4F 2 pt (1)	74	3	17	11*	25*	38*	68*
Endura 70WG 9.2 oz (2)	61*	6	25	14*	31*	32*	62*
Endura 70WG 9.2 oz (3)	18*	1	13	4*	12*	7*	32*
check	98	7	48	27	62	90	99
LSD (P=0.05)[2]	29	NS	NS	11	23	28	27
Yield (lb/A)							
Omega 4F 2 pt (1)	2940*	2931	4147	3285	2931	4147*	3076*
Endura 70WG 9.2 oz (2)	2904*	2704	3857	3412	2695*	4120*	2704*
Endura 70WG 9.2 oz (3)	3621*	3548	3930	3285	3058*	4710*	3140*
check	1733	3013	3340	2859	2260	2813	1779
LSD (P=0.05)	565	NS	NS	NS	308	603	886
Value ($/A)[3]							
Omega 4F 2 pt (1)	527	510	732	582	518	743	538
Endura 70WG 9.2 oz (2)	521	471	681	604	477	738	473
Endura 70WG 9.2 oz (3)	649	617	694	582	541	844	549
check	311	524	590	506	400	504	311

1 Omega was applied following first symptoms (on demand; August 8), while Endura was applied twice preventively (July 24 and August 14) and three times preventively (July 24, August 14, and August 27).

2 Least significant difference at P=0.05, NS=treatment effect not significant at P=0.05.

3 Based on an average grade of 72 for Okrun, 71 for Tamspan 90, 71 for Tamrun 96, 72 for Tamrun 0L 01, 71 for Georgia Green, 73 for Georgia Hi O/L, and 71 for AT 1-1.

Unlike previous trials, the benefits of fungicide treatment were not additive to varietal selection for all varieties. Planting Tamrun 96 without fungicide treatment for Sclerotinia blight was among the most profitable strategies in this trial.

Timing and Rate of Omega Applications

In this study, all of the spray programs were initiated when symptoms of Sclerotinia blight appeared. Single applications of 1.0, 1.5, and 2.0 pt/A were made. Rates of 0.5, 0.75, and 1.0 pt/A were applied three times on 10-day intervals. Rates of 0.75 and 1.0 pt/A were applied twice on 21-day intervals. A preventive program of 1.5 pt/A applied twice and a untreated check were included for comparison. Disease pressure was severe (77%) in check plots that yielded less than 2000 lb/A. In general, the spray programs were only moderately effective. The best Omega treatments had more than 40% infection and yielded from 2700 to 3000 lb/A. The spray programs that provided the highest partial returns (crop value less the treatment cost), which ranged from $404 to $460/A, were the single applications at 1.5 and 2.0 pt/A, two applications at 0.75 and 1.0 pt/A on 21-day intervals, and three applications at 1.0 pt/A on 10-day intervals.

Southern Blight and Limb Rot

Southern blight is another damaging soilborne disease that is a problem statewide. Effective management of southern blight relies on the use of fungicides because varieties with resistance are not locally adapted and long crop rotations often are not feasible. Folicur, Abound, and Moncut have provided good to excellent disease control in fields with a history of southern blight. Folicur and Abound also are effective against foliar diseases. Moncut must be tank-mixed with another fungicide to provide control of foliar diseases. In 2002, two trials were conducted in Bryan County in a field with a history of southern blight.

Effect of Reduced Spray Programs

In an effort to reduce the costs of peanut production, fungicide programs consisting of two to four applications were compared to a full season program for control of soilborne and foliar diseases. A full-season program of six applications of Tilt/Bravo served as the check treatment. Southern blight pressure was heavy in this trial, but it developed late in the season and was unevenly distributed over the plots. Leaf spot became a problem in September, but most treatments provided adequate control in that defoliation was maintained below 50%. Harvest was delayed until October 31 due to wet conditions in October, but frost damage was not a problem at this site. Limb rot was prevalent at harvest, but its distribution was uneven.

The Abound/Folicur treatment was the only spray program that statistically reduced southern blight compared to the Tilt/Bravo check (Table 4). The high (labeled) rate of Abound and the Omega treatment also appeared to be effective. The lack of effectiveness of the three-spray Folicur program was surprising. The high rate of Abound and the Abound/Folicur programs were the only treatments that increased yields compared to the Tilt/Bravo check. In comparing partial returns (crop value less the treatment cost) to the Tilt/Bravo check, the high rate of Abound and the Abound/Folicur program returned more than $150/A, the low rate of Abound returned about $80/A, and the other programs were not profitable.

Evaluation of Full-Season Spray Programs

Full-season spray programs with Abound, Folicur, and Moncut were compared to the experimental fungicides Headline, AMS 21619A, and USF2010 for control of southern blight. A full-season program of Bravo on 14-day intervals served as a control. Unfortunately, southern blight did not develop to damaging levels in this study and all of the spray programs provided excellent leaf spot control. Limb rot was a problem at harvest, but treatment effects on this disease were not statistically different. Yields were high in this study, ranging from 3800 to 4400 lb/A. The high rate of AMS 21619A (4474 lb/A) and the Abound program (4447 lb/A) resulted in statistically increased yields compared to the Bravo check (3848 lb/A). However, the yield increases were not associated with any obvious differences in disease.

Foliar Diseases

Foliar diseases are widespread across all production areas of Oklahoma and can be damaging when severe. Where early leaf spot is not controlled, yield losses have averaged from 500 to 700 lb/A. However, losses exceeding 1000 lb/A are possible in years when weather patterns favor severe disease development. Pepper spot is a foliar disease that has increased in prevalence in recent years, particularly on runner varieties. However, the damage potential of this disease and effective treatments for its control have not been identified. Evaluation of new fungicides for

Table 4. Evaluation of reduced fungicide programs for control of southern blight and limb rot on the variety Okrun – Bryan County, 2002.

Treatment & Rate/A (timing[1])	Southern blight (%)	Limb rot (%)	Defoliation (%)	Yield (lb/A)	Value ($/A)[2]
Tilt/Bravo 18 fl oz (1-6)	26	40	1	2695	514
Folicur 3.6F 7.2 fl oz (2,3,4)	28	30	21	2723	519
Abound 2.1F 12.3 fl oz (2,4)	31	70	39 *	3067	584
Abound 2.1F 18.4 fl oz (2,4)	14	23	46 *	3848 *	733
Abound 2.1F 12.3 fl oz (2,4) Folicur 3.6F 7.2 fl oz (3)	6 *	34	15	3548 *	676
Headline 2.1E 12 fl oz (1,3) Bravo 720 1.5 pt (2,4,5)	29	19	0	2886	550
Bravo 720 1.5 pt + Omega 4F 1.5 pt (2,4)	15	20	4	3058	583
LSD (P=0.05)[3]	18	NS	30	540	

1 Spray numbers (1-6) correspond to the spray dates of July 5, July 23, August 6, August 20, September 3, and September 18.
2 Values based on grade, which averaged 78.
3 Least significant difference; NS – treatment effect not significant at P=0.05. Means within a column followed by an asterisk (*) are significantly different from the Tilt/Bravo check.

control of foliar diseases has been difficult in recent years due to drought conditions and resulting low disease pressure.

Evaluation of Full-Season and Reduced Spray Programs

Fungicides were compared for control of early leaf spot on Tamspan 90 and Tamrun 96 at the Agronomy Research Farm in Perkins and at the Caddo Research Station. New fungicides evaluated included Headline, which has provided superior control of early leaf spot in previous trials; and Stratego, a newly registered fungicide for foliar disease control. Full-season programs consisting of six applications applied on a 14-day schedule included Bravo, Tilt/Bravo, the Folicur block program, Stratego, and Bravo/Abound. Reduced fungicide programs included Tilt/Bravo applied according to the MESONET early leaf spot advisory, four calendar-based applications of Bravo alternated with Headline at 6 and 9 fl oz, and three calendar-based applications of Folicur alternated with Bravo.

In Perkins, early leaf spot appeared in late July and increased during August and September to severe levels on Tamspan 90. All spray programs reduced leaf spot during the growing season until late in the season. On the last evaluation date (Table 5), leaf spot levels on Tamspan 90 for the reduced fungicide programs and the Folicur block did not statistically differ from the untreated check. The full-season Bravo program provided the best disease control. All spray programs reduced defoliation below 50% at the end of the season. Yields were increased compared to the untreated check for all spray programs. Yield increases ranged from 400 lb/A for the Folicur block program to 1000 lb/A for the high rate of Headline. Partial economic returns (crop value less treatment costs) were positive for all fungicide programs except the Folicur block and the Bravo/Abound programs. This was attributed to the lack of disease pressure from soilborne diseases and the high cost for the full-season Folicur and Abound programs. The results in Perkins were similar for Tamrun 96. At the Caddo Research Station, disease pressure from early leaf spot was negligible until October and never reached damaging levels on either Tamspan 90 or Tamrun 96. As a result, none of the spray programs increased yield and their use was not profitable.

Tillage Effects on Peanut Diseases Control

Reduced tillage is increasing in popularity as a means of reducing production costs and soil erosion. Previous research has shown that southern blight and leaf spot pressure may be greater in no-till production than conventional tillage. However, diseases were not increased when strip tillage (ro-till) was employed. However, this research needs to be verified in different locations. In addition, questions about the effectiveness of fungicide programs under reduced tillage have been posed. In 2002, trials were conducted in Caddo County to address the impact of tillage on diseases and their management.

Effectiveness of Full and Reduced Fungicide Programs Under Strip Tillage

The trial was established in a field with a history of damage to AT-120, an early maturing runner variety, due to soilborne diseases such as pod rot. Because AT-120 is being replaced by AT1-1,

Table 5. Effectiveness of full and reduced spray programs on control of early leaf spot on the variety Tamspan 90 – OSU Agronomy Research Farm, Perkins, 2002.

Treatment and rate/A (timing[1])	Leaf spot (%)	Defoliation (%)	Yield (lb/A)	Value ($/A)[2]	Cost ($/A)[3]	Return ($/A)[4]
Bravo 720 1.5 pt (1-6)	6 *	1 *	3616 *	566	72	494
Bravo 720 1.5 pt (1,6) Folicur 3.6F 7.2 fl oz (2-5)	71	39 *	3049 *	477	123	354
Bravo 720 1.5 pt (1,3,5,6) Abound 2.1F 18.5 fl oz (2,4)	30 *	10 *	3064 *	480	126	354
Stratego 2.1E 7 fl oz (1-6)	34 *	13 *	3724 *	583	72	511
Headline 250E 6 fl oz (1,3) Bravo 720 1.5 pt (2,5)	46 *	12 *	3499 *	548	?	?
Headline 2.08E 9 fl oz (1,3) Bravo 720 1.5 pt (2,5)	70	32 *	3746 *	586	?	?
Bravo 720 1.5 pt (1) Folicur 3.6F 7.2 fl oz (2,5)	75	45 *	3115 *	488	61	427
Tilt/Bravo 18 fl oz (1-6)	39 *	3 *	3274 *	513	71	442
Tilt/Bravo 18 fl oz (Adv.)	77	48 *	3398 *	532	48	484
check	91	77	2643	414	0	414
LSD (P=0.05)[5]	24	13	324			

1 Spray numbers (1 - 6) correspond to the spray dates of June 24, July 8, July 22, August 5, August 16, and August 30. Adv. = Sprays applied according to the early leaf spot advisory program on June 24, July 17, August 15, September 10.
2 Cost based on $5.98/pt for Bravo, $3.01/fl oz for Folicur, $1.95/fl oz for Abound, and $9.00/7 fl oz Stratego, and $3.00/application for application costs.
3 Crop value was based on grade, which averaged 62.
4 Partial return = (crop value) - (treatment cost).
5 Least significant difference; means in a column followed by an asterisk (*) are significantly different from the untreated check at P=0.05.

fungicide programs were evaluated on this variety and Tamrun 96, which has shown resistance to pod rot and other soilborne diseases. Full and reduced fungicide programs were designed to control foliar and soilborne diseases. The full-season fungicide program consisted of the Folicur block program. Reduced fungicide programs included a four-spray Headline/ Bravo alternation; two applications of Folicur, Abound, and Bravo/Moncut; and a single application of Abound.

Pod rot developed at moderate levels on AT1-1, but not on Tamrun 96 confirming previous observations. However, yield responses to fungicide programs appeared to result primarily from control of early leaf spot, which became severe in the study. At the end of the season, the Folicur block and Headline/Bravo programs provided the best disease control on Tamrun 96 (Table 6). All of the spray programs except Bravo/Moncut kept defoliation at 50% or less. Similarly, yield increases above the untreated check were statistically significant for all spray programs except Bravo/Moncut. Yield increases ranged from 700 lb/A for the Abound programs and the reduced Folicur program to 1400 lb/A for the Headline/Bravo program. Based on the costs of the fungicide programs, partial returns (crop value less treatment costs) were increased over the untreated check by $75 to $100/A for all of the spray programs except Bravo/Moncut. Had harvest of this trial been delayed, the Abound and reduced Folicur programs would likely have failed to prevent yield loss from early leaf spot.

Impact of Tillage System on Disease Development

Levels of disease were monitored in replicated plots of conventional tillage, strip tillage, and no tillage in Caddo County. Plots were planted with Tamrun OL 01 and Tamrun 96 and did not receive any fungicide applications. There were no differences in the onset of early leaf spot among the tillage systems.

Seedling Disease

Seedling disease is usually not a problem in peanut production. Fungicide treatments such as Vitavax PC and Tops PC are applied to commercial seeds to effectively control seedling disease. A trial was conducted at the OSU Agronomy Farm in Perkins in which experimental seed treatments were compared to Vitavax PC for control of seedling disease. The experimental treatments

Table 6. Effect of full and reduced spray programs on control of early leaf spot on the variety Tamrun 96 grown under strip-till – Caddo County, 2002.

Treatment and rate/A (timing[1])	Leaf spot (%)	Defoliation (%)	Yield (lb/A)	Value ($/A)[2]	Cost ($/A)[3]	Return ($/A)[4]
Bravo 720 1.5 pt (1,6) Folicur 3.6F 7.2 fl oz (2-5)	7 *	0 *	5391 *	980	123	857
Headline 2.08E 15 fl oz (1,3) Bravo 720 1.5 pt (2,5)	11 *	1 *	5781 *	1051	?	?
Bravo 720 1.5 pt + Moncut 70DF 1.0 lb (2,4)	72	62	4347	790	74	716
Folicur 3.6F 7.2 fl oz (2,4)	67	50	5028 *	914	50	864
Abound 2.08E 18.4 fl oz (2,4)	64	37 *	5191 *	943	78	893
Abound 2.08E 18.4 fl oz (2)	67	50	5137 *	934	39	895
check	75	57	4302	782	0	782
LSD (P=0.05)[5]	14	10	398			

1 Spray numbers (1-6) correspond to the spray dates of June 27, July 9, July 24, August 7, August 21, and September 4.
2 Cost based on $5.98/pt for Bravo, $3.01/fl oz for Folicur, $1.95/fl oz for Abound, and $9.00/7 fl oz Stratego, $25/lb for Moncut, and $3.00/application for application costs.
3 Crop value was based on grade, which averaged 74.
4 Partial return = (crop value) - (treatment cost).
5 Least significant difference; means in a column followed by an asterisk (*) are significantly different from the untreated check at P=0.05.

(A13845A, A13847A, and A13848A) were mixtures of the fungicides Apron, Maxim, and Abound at various ratios. For two of the treatments, Abound at 6 fl oz/A was sprayed in the planting furrow in addition to Vitavax PC and A13848A.

All of the treatments dramatically increased plant stand compared to untreated seed. Plant stand for the treatments were similar statistically, ranging from 68% to 78%, compared to 8% for the untreated check. None of the experimental treatments increased the stand compared to Vitavax PC. The addition of Abound in-furrow did not increase the stand compared to respective seed treatments alone. All of the seed treatments increased yields compared to the 1162 lb/A for the untreated check. Yields for the treatments ranged from 3378 to 4156 lb/A. The only treatment that increased yields compared to Vitavax PC was the combination of A13848A and Abound in-furrow. However, the combination of Abound in-furrow with the Vitavax PC or A13848A seed treatments did not increase yields compared to the respective seed treatments alone. Results demonstrated the value of seed treatments in achieving an adequate stand and dramatically increasing yields compared to no seed treatment. However, the addition of an in-furrow application of Abound did not translate into an improved stand or increased yield.

Disease Management in Southwestern Oklahoma

Peanut production is increasing in far southwestern Oklahoma. Growers in this part of the state have not experienced severe losses to disease because of low rainfall and humidity, and the soils do not have a long history of peanut production. However, foliar diseases, southern blight, limb rot, and pod rot have been identified as potentially damaging diseases in this new peanut area.

In 2002, a trial was conducted in Jackson County that was focused on determining the response of peanut varieties to fungicide programs (Table 7). Because high disease pressure was not anticipated, reduced-input spray programs were evaluated on the three most commonly grown varieties in the area. Varieties included Tamrun 96, which has moderate resistance to several soilborne diseases, and AT-120 and Okrun, which are susceptible to most soilborne diseases. Fungicide programs consisted of one or two applications, targeted at either foliar disease (Bravo, Tilt/Bravo), soilborne disease (Moncut), or both (Abound, Folicur, Headline).

Early leaf spot was the primary disease at this site. The disease appeared in early August and increased to about 90% infection and 70% defoliation in the untreated check plots at harvest. AT-120 was slightly more susceptible to leaf spot than Okrun or Tamrun 96. For each variety, all of the spray programs except Moncut reduced levels of leaf spot compared to the untreated check. Disease control was excellent on September 24, but increased late in the season because the last applications were made in early August. Headline and Folicur provided the best disease control. On October 15 when the plots were dug, percent incidence of leaf spot/defoliation averaged 28/15 for Bravo, 17/3 for Folicur, 14/2 for Headline, 92/77 for Moncut, 77/35 for the single application of Abound, 33/5 for two applications of Abound, and 68/26 for the advisory program using Tilt/Bravo. Yields and grades were high at this location. Yield responses to fungicide programs were similar for each variety. All of the fungicide programs yields increased compared to the non-treated check. Yield increases ranged from 700 lb/A for Moncut to 1100 lb/A for Headline. The significant yield response from Moncut was surprising because it did not control leaf spot, and soilborne diseases such as southern blight and limb rot were not evident. Based on the cost of the fungicide programs, which ranged from $24/A for Bravo and Tilt/Bravo to $78/A for the two applications of Abound, all spray programs increased partial returns (crop value less treatment costs) above the untreated check. Increases in partial returns were $70/A for Moncut and more than $100 for the other fungicide programs. The partial return for Headline could not be determined because the cost for this fungicide is not yet known.

Table 7. Effect of spray programs on yield and value of peanut varieties – Jackson County, 2002.

Treatment and rate/A (timing[1])	AT-120	Okrun	T-96	Mean[2]
Yield (lb/A)				
Bravo WS 6F 1.5 pt (1,2)	6244	6216	5971	6144 a
Folicur 3.6F 7.2 fl oz (1-2)	6688	6334	5781	6268 a
Headline 2.1E 9.2 fl oz (1,2)	6416	6534	5980	6310 a
Moncut 70DF 1.0 lb (1-2)	5699	6126	5899	5908 a
Abound 2.1F 18.5 fl oz (1)	6289	6244	5971	6168 a
Abound 2.1F 18.5 fl oz (1,2)	6598	6198	6162	6319 a
Tilt/Bravo 18 fl oz (adv)	6153	5999	6098	6083 a
check	5055	5236	5345	5212 b
Mean[3]	6143 a	6111 a	5901 a	
Value ($/A)[4]				
Bravo WS 6F 1.5 pt (1,2)	1149	1179	1102	1143
Folicur 3.6F 7.2 fl oz (1-2)	1230	1202	1067	1166
Headline 2.1E 9.2 fl oz (1,2)	1180	1240	1104	1175
Moncut 50W 1.2 lb (1-2)	1048	1162	1089	1100
Abound 2.1F 18.5 fl oz (1)	1157	1185	1102	1148
Abound 2.1F 18.5 fl oz (1,2)	1214	1176	1137	1176
Tilt/Bravo 18 fl oz (adv)	1132	1138	1126	1132
check	930	993	987	970
Mean	1130	1159	1089	

1 Spray numbers 1 to 2 correspond to the spray dates of 1 = July 10 and 2 = August 7. Adv. = two sprays applied according to the MESONET early leaf spot advisory program on July 10 and August 5.

2 Mean values over varieties followed by an asterisk (*) are significantly different from the untreated check at P=0.05.

3 Mean values over treatments followed by the same letter are not significantly different at P=0.05.

4 Values based on grade, which averaged 75 for AT-120, 77 for Okrun, and 75 for Tamrun 96.

Development of Integrated Strategies for Management of Soilborne Peanut Diseases*

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2002 progress made possible through OPC support

- Incidence of Sclerotinia blight in research plots at the Caddo Research Station in 2002 increased dramatically near the end of the peanut growing season, thus, allowing a meaningful disease evaluation of the advanced breeding lines.
- Differences in Sclerotinia blight incidence and yield between susceptible and resistant breeding lines were evident in several of the field studies.
- Seven runner breeding lines, with high oleic content, exhibited good levels of resistance to Sclerotinia blight.
- One runner breeding line, TX994374, with enhanced oleic content, produced 1900 lb/A more than Florunner under moderately severe Sclerotinia pressure.
- One runner breeding line, TX991720, with enhanced oleic content, had the lowest Sclerotinia incidence and the highest yield with a grade of 72.
- Tamrun 96 and Southwest Runner had the lowest incidence of southern blight at the Yoakum location in Yoakum, TX and Bryan County, OK.
- Yield of Tamrun 96 at the Yoakum location was superior to other peanut lines.
- In six studies at four different Oklahoma locations, the advanced breeding line Tamrun OL 02, with enhanced high oleic content, had similar grades and incidences of Sclerotinia blight as Tamrun OL 01 and Tamrun 96. However, Tamrun OL 02 had yields of 250 lb/A and 380 lb/A less than Tamrun OL 01 and Tamrun 96, respectively.

Peanut yield and grade are affected by several soilborne diseases. Sclerotinia blight, one of the two major soilborne diseases, is continuing to be a major threat to peanut production in Oklahoma and more so now with the new farm bill reducing peanut prices. Continuous cropping of peanuts favors a buildup of sclerotial populations in soil to a level that often cause severe epidemics on an annual basis. Chemical management of Sclerotinia blight is necessary, but it is costly to growers under the current farm bill. The second important soilborne disease is southern blight, which causes economical losses if not managed. Therefore, the ultimate goal of this research is to develop a disease management system for peanut

* Two Ph.D. graduate students are assisting in these investigations.

production utilizing natural resistance with minimum inputs for sustaining profitability under the 2002 farm commodity program.

Sclerotinia Blight Resistance Research

This research has been conducted continually since 1982 to discover disease resistance in the peanut germplasm and breeding lines to the Sclerotinia blight fungus and other soilborne pathogens. The incidence of Sclerotinia blight in many of the research plots at the Caddo Research Station in 2002 increased dramatically near the end of the peanut growing season, thus, allowing a meaningful disease evaluation of the advanced breeding lines. Therefore, differences in Sclerotinia blight incidence and yield between susceptible and resistant breeding lines were evident in several of the field studies.

Several advanced runner peanut lines, with enhanced oleic acid content, from the breeding program at Texas A&M University and Oklahoma State University are being continually evaluated for resistance to Sclerotinia blight in field plots at multiple locations in Oklahoma and Texas. Several runner-type peanut breeding lines with high oleic acid content exhibited less Sclerotinia than the cultivar Florunner. Performance (Sclerotinia reaction, yield, and grade) of a selected number of peanut breeding lines at the Caddo Research Station are shown in Tables 1 and 2.

New sources of resistance to Sclerotinia blight were identified in new peanut germplasm from Ecuador and Peru that were evaluated at the Caddo Research Station in 2001 and 2002 (Table 3).

Southern Blight Research

A study at Yoakum, TX in cooperation with Texas A&M University, was conducted during the 2002 growing season to evaluate the reaction of selected advanced peanut breeding lines to the southern blight organism. Tamrun 96 and Southwest Runner had the lowest incidence of southern blight at both the Yoakum, TX and Bryan County, OK locations as compared to other lines in the test. Comparison of the yields showed that Tamrun 96 was superior to the other lines in Yoakum. (Table 4).

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Table 1. Runner breeding line evaluation to Sclerotinia blight (Texrun 1) – Caddo Research Station, Ft. Cobb, OK, 2002.

Entry[1]	Yield	Rank[2]	% Sclerotinia Blight[3]	Rank[4]	Grade[5]
Tamrun OL 01	3231	5	48.8	12	73
Tamrun 96	3606	2	37.3	8.5	72
Georgia Green	2819	15	33.5	6	75
Flavor Runner 458	2105	17	63.3	17	73
Florunner	1670	20	68.0	18	72
TX977116	1936	18	76.0	19	75
TX972056	3001	10	37.5	10	71
TX994371	3400	3	41.8	11	67
TX994392	3267	4	32.3	5	73
TX971783	2977	12	30.0	3	73
TX977045	2723	16	52.5	13	68
TX993380	3110	8	53.5	14	70
TX977239	2916	13	56.3	16	70
Tamrun OL 02	2880	14	56.0	15	70
TX977046	1803	19	80.5	20	70
TX994374	3655	1	19.3	1	67
TX944396	3025	9	34.3	7	71
TX994399	3219	6	37.3	8.5	71
TX994395	3171	7	31.5	4	67
TX994389	2977	11	30.0	2	71
LSD 0.05	653	22.4			
Pr > F	0.0001	0.0001			

[1] Planted May 13 and harvested November 11.
[2] Rank highest to lowest.
[3] Percent Sclerotinia blight was determined by dividing the number of infection loci by the number of potential infection loci and multiplying by 100. An infection locus is defined as an area of disease symptoms equal to or less than 6 inches long in a standard row. Evaluation date October 2.
[4] Rank lowest to highest.
[5] Average of 2 replications.

Table 2. Runner breeding line evaluation to Sclerotinia blight (Tex-run2) – Caddo Research Station, Ft. Cobb, OK, 2002.

Entry[1]	Yield	Rank[2]	% Sclerotinia Blight[3]	Rank[4]	Grade[5]
TX991706	3017	5	28.3	8	71
TX991711	2920	8.5	19.7	3	71
TX991712	2920	8.5	23.3	4.5	72
TX991720	3388	1	14.7	1	72
TX991713	2775	12	15.3	2	73
TX991709	3259	3	24.3	7	72
TX991701	2888	10	24.0	6	73
TX991714	2710	13	35.7	13	70
TX991710	2678	15	29.3	10.5	73
TX991705	2968	7	29.3	10.5	71
TX991716	2388	17	23.3	4.5	72
TX991717	2227	18	51.7	16	70
TX991722	2694	14	42.3	14	69
TX991721	2000	20	62.3	20	68
TX991719	2791	11	28.7	9	71
TX991715	2468	16	35.7	12	71
Tamrun 98	2130	19	57.0	19	72
Tamrun 96	3372	2	51.0	15	72
Tamrun OL 01	3065	4	55.7	17	70
Tamrun OL 02	2969	6	56.0	18	71
LSD 0.05	502	18.3			
Pr > F	0.0001	0.0001			

1 Planted May 13 and harvested November 6.
2 Rank highest to lowest.
3 Percent Sclerotinia blight was determined by dividing the number of infection loci by the number of potential infection loci and multiplying by 100. An infection locus is defined as an area of disease symptoms equal to or less than 6 inches long in a standard row. Evaluation date October 2.
4 Rank lowest to highest.
5 Average of 2 replications.

Table 3: Reaction of selected peanut lines to *Sclerotinia* minor in the greenhouse and in field plots (2002).

Entry ID[1]	Origin	Botanical Type	Disease Incidence (%)[2]	AUDPC[3]
PI 501274 (R 88)	Peru	Runner/Virginia	3	74
PI 501280 (R 93)	Peru	Valencia	3	105
PI 501286 (R 98)	Peru	Valencia	53	55
PI 501290 (R 101)	Peru	Valencia	15	88
PI 501980 (R 116)	Peru	Unknown	13	82
PI 501996 (R 124)	Peru	Unknown	45	63
PI 502014 (R 137)	Peru	Unknown	15	78
PI 502018 (R 140)	Peru	Unknown	55	73
PI 502036 (R152)	Peru	Unknown	13	84
PI 502074 (R 179)	Peru	Unknown	23	94
PI 502093 (R 189)	Ecuador	Valencia	13	48
PI 502128 (R 213)	Peru	Unknown	8	91
PI502156 (R 228)	Peru	Unknown	33	73
PI 497618 (R 268)	Ecuador	Valencia	38	62
Okrun	USA	Runner	70	109
Southwest runner	USA	Runner	26	102

[1] Identification number.
[2] Disease incidence in field plots- 2002 Caddo Research Station, Ft. Cobb, OK.
[3] AUDPC- Greenhouse evaluations in 2002.

Table 4. Southern blight cultivar evaluation – Yoakum, TX, 2002.

Entry	Disease incidence	Yield (Lb)/A
Okrun	11.1	1965
SW Runner	5.0	1665
Tamrun 96	5.5	3127
GA Green	12.5	1702
Tamrun 98	12.8	1802
Tamrun OL 01	10.3	2659
Tamrun OL 02	11.8	2569
GA 942007	9.5	2078
LSD (P=0.1)	3.6	587

Identification of New Sources of Resistance to Sclerotinia Blight in Peanuts

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2002 progress made possible through OPC support

- Twenty germplasm lines from the USDA core collection were confirmed to be highly resistant to Sclerotinia blight.
- Thirty-two additional germplasm lines from the USDA core collection were resistant.
- Several of the highly resistant and resistant entries had yields that were statistically similar to Tamspan 90.

Sclerotinia blight remains a destructive disease in Oklahoma. It is prevalent in all areas of the state except in far southwestern Oklahoma. In hopes of identifying new sources of resistance to Sclerotinia blight, the core collection, a subset of the USDA peanut germplasm collection comprising 745 entries, was obtained from Corley Holbrook, USDA/ARS Tifton, GA. The entries were planted in two-row, non-replicated plots at the Caddo Research Station in a field with a history of severe Sclerotinia blight in 2001. Considerable variability in disease reaction was observed. A total of 81 lines were selected for further evaluation. Of the 81 retained lines, 43 were highly resistant (0% disease) and 31 were resistant (less than 10% disease).

Replicated trials with two-row plots were planted in 2002 at the Caddo Research Station in a field with a history of Sclerotinia blight. Seed availability was limited for some of the selections. Therefore, three trials containing two, three, and four replications each were established. Resistant (Tamspan 90), moderately resistant (Tamrun 96), and susceptible (Okrun) check varieties were included in each trial for reference.

Stand establishment was excellent, but plant growth was slow, possibly because of nematode damage. Most of the rows never lapped. Development of Sclerotinia blight was also delayed along with the plant growth. Compared to nearby trials where Sclerotinia blight appeared in mid-August, sufficient disease development for evaluation did not occur until mid-September. The foliar disease pepper spot became severe in many of the entries. Sclerotinia blight increased to moderate levels throughout October when it remained too wet to harvest. The final disease evaluation was taken on October 30 when the vines exhibited a moderate level of frost damage. The plots were harvested on November 13 when frost damage was severe. Overall, plot yields were not significantly correlated with levels of Sclerotinia blight. This was attributed to the late-season disease development and the low yield potential for many of the entries.

In Trial 1, which contained two replications, Okrun and Tamrun 96 were among the most susceptible entries to Sclerotinia blight, while Tamspan 90 was among the most resistant (Table 1). Three of the entries, along with Tamspan 90, were highly resistant and showed no infection. Another eight were resistant and had less than 10% infection. Of the highly resistant and resistant entries, lines 505 and 143 had better yields than Tamspan 90. All of the other entries, which had appeared resistant or highly resistant in 2001, must have been escapes because they were more susceptible in 2002. Except for entry 505, which was resistant to pepper spot and Sclerotinia blight, most of the entries that were resistant to pepper spot were susceptible to Sclerotinia blight, and

Table 1. Reaction of selected peanut entries from the USDA core collection to Sclerotinia blight and pepper spot, Trial 1 (2 replications) – Caddo Research Station, 2002.

Entry	Maturity (1-6)[1]	Plant Type (1-6)[2]	Sclerotinia Blight (%)	Pepper Spot (%)	Yield (lb/A)
Okrun	3	3	46	0	2105
329	4	2	41	0	1162
Tamrun 96	3	3	32	0	2396
238	3	4	32	0	1270
466	3	5	32	5	617
763	3	5	32	0	762
599	3	5	22	0	690
92	3	5	19	0	472
804	3	4	19	0	472
780	2	5	4	25	726
828	3	5	4	40	653
399	2	5	2	60	617
820	2	5	2	5	762
786	2	5	1	65	799
505	3	5	1	7	1597
273	3	4	1	25	1125
67	2	5	1	35	907
143	2	5	0	65	1888
785	2	5	0	50	1053
Tamspan 90	2	5	0	25	1270
569	2	5	0	55	1234
LSD 0.05[3]			20	26	609

1 1=early, 4=late
2 1=very flat, 2=very erect
3 Least significant difference.

vice versa. Five entries (505, 273, 143, 785, and 565) appeared to warrant further evaluation as sources of resistance to Sclerotinia blight.

In Trial 2, which contained three replications, Okrun was susceptible to Sclerotinia blight, Tamrun 96 showed moderate resistance, and Tamspan 90 was resistant (Table 2). Entries 570 and 481 were highly resistant to Sclerotinia blight and showed no infection. Nine other entries were resistant to Sclerotinia blight and had less than 10% infection. Except for lines 321 and 766, which were resistant to both Sclerotinia blight and pepper spot, most of the entries that were resistant to Sclerotinia blight were susceptible to pepper spot and vice versa. Except for lines 158 and 128, most of the entries that were among the most susceptible to Sclerotinia blight in 2002 had appeared resistant or highly resistant in 2001. Overall, yields were low in this trial as indicated by the low productivity of Tamrun 96 and Tamspan 90. Of the entries that were highly resistant or resistant to Sclerotinia blight, 766, 469, 321, and 821 had yields that were statistically similar to Tamspan 90. All of the entries with an

Table 2. Reaction of selected peanut entries from the USDA core collection to Sclerotinia blight and pepper spot, Trial 2 (3 replications) – Caddo Research Station, 2002.

Entry	Maturity (1-6)[1]	Plant Type (1-6)[2]	Sclerotinia Blight (%)	Pepper Spot (%)	Yield (lb/A)
Okrun	3	3	54	0	1791
463	4	3	46	0	1839
227	4	2	38	0	1307
345	3	3	36	0	1283
241	3	3	32	2	1355
Tamrun96	3	3	22	0	2057
158	4	3	20	0	1089
723	3	3	15	10	1452
128	3	4	12	13	605
103	4	5	10	0	1234
321	3	5	8	3	1234
Georgia Hi O/L	3	2	6	0	2154
766	3	5	4	7	1694
409	3	5	4	33	823
176	3	5	3	50	1016
469	2	5	2	37	1379
Tamspan 90	2	5	2	47	1742
454	3	5	2	35	823
821	2	5	2	53	1162
570	2	5	0	67	532
481	2	5	0	43	1065
LSD 0.05[3]			17	26	667

1 1=early, 4=late
2 1=very flat, 2=very erect
3 Least significant difference.

erect plant type were resistant or highly resistant to Sclerotinia blight. Entries with a more prostrate plant type, typical of runner varieties, were more susceptible to Sclerotinia blight.

Pressure from Sclerotinia blight was lower in Trial 3, which contained four replications, compared to the other two trials. Okrun again was among the most susceptible entries in the trial, and Tamrun 96 was resistant with less than 10% infection (Table 3). The lower disease pressure was reflected in yields of 3000 lb/A or more for Okrun and Tamrun 96. Fifteen entries along with Tamspan 90 were highly resistant and had 0% Sclerotinia blight. All of these entries had upright plant types and were susceptible to pepper spot. The highly resistant entries 361, 379, 380, 66, 391, 562, and 129 had yields that were similar statistically to Tamspan 90. Another 17 entries were resistant and had less than 10% infection. Among the resistant entries, lines 464, 799, 374, 377, 474, and 125 had yields that were similar statistically to Tamspan 90. Two resistant entries (464 and 582) had a prostrate (runner) plant type, but one (582) was low yielding. All of the entries that were not classified as resistant and had more than 10% Sclerotinia blight were resistant to pepper spot. However, some of the entries that were resistant to Sclerotinia blight were also resistant to pepper spot.

Among the 81 entries selected from the core collection in 2001 for resistance to Sclerotinia blight, 74 produced sufficient seed for evaluation in replicated plots in 2002. Of the 74 entries, 20 were confirmed to be highly resistant and another 32 were confirmed to be resistant with less than 10% infection. Those with decent yield potential will be evaluated again in replicated trials in 2003 and their response to fungicide treatment will be determined to further confirm their resistance. Each entry in the core collection represents a larger group of related entries in the USDA peanut germplasm collection. Therefore, about 10 of the best entries will be selected and related germplasm from the USDA collection will be obtained and evaluated.

Table 3. Reaction of selected peanut entries from the USDA core collection to Sclerotinia blight and pepper spot, Trial 3 (4 replications) – Caddo Research Station, 2002.

Entry	Maturity (1-6)[1]	Plant Type (1-6)[2]	Sclerotinia Blight (%)	Pepper Spot (%)	Yield (lb/A)
Okrun	3	3	32	0	3176
679	3	3	31	0	2178
326	4	3	29	0	2124
457	4	3	26	0	1597
341	3	3	19	0	2178
352	3	3	18	0	1543
459	3	3	15	0	1270
532	3	6	10	0	2069
461	3	4	9	0	1416
464	4	3	7	0	1742
799	3	4	7	0	2850
Tamrun 96	3	3	6	0	3557
125	2	5	5	0	1633
474	3	5	5	32	1797
632	3	4	4	12	1307
582	3	3	4	2	926
377	3	5	3	47	1779
827	3	6	2	0	944
81	2	5	1	70	962
398	2	5	1	40	1398
479	2	5	1	37	1434
184	2	5	1	57	1089
437	2	5	1	75	1053
374	2	5	1	47	2124
486	2	5	1	45	1307
378	3	5	1	26	1488
307	2	5	0	47	1307
361	2	5	0	50	1761
379	3	5	0	40	1888
426	2	5	0	75	980
380	3	5	0	32	1924
460	2	5	0	45	1488
60	2	5	0	69	817
Tamspan 90	2	5	0	49	2015
180	2	5	0	44	1488
33	2	5	0	61	1089
205	2	5	0	56	1488
66	2	5	0	55	1652
73	2	5	0	60	817
391	3	5	0	42	1633
562	2	5	0	50	1960
129	2	5	0	55	1761
LSD 0.05[3]			10	18	459

1 1=early, 4=late
2 1=very flat, 2=very erect
3 Least significant difference.

Management of Sclerotinia Blight and Verticillium Wilt in Peanuts

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2002 progress made possible through OPC support

- Tamrun 96 and Tamrun OL 01 performed the best overall in the three different environments.
- Tamrun 96 and Tamrun OL 01, a high oleic acid cultivar, had an average yield greater than 4000 lb/A over the three locations and the greatest dollar value per acre.
- All lines had grades lower that the standard cultivar, Okrun, which had a grade of 77.

The objective of this research is to evaluate disease resistance in advanced peanut breeding lines, including the high oleic breeding lines, under field conditions to soilborne pathogens.

Reaction of Peanut Lines to Southern Blight, Limb Rot, and Pod Rot in Small Field Plots at Chickasha, Liberty Bottom, and Martha

Field plots were planted on April 30, May 14, and May 23, 2002, in Martha, Chickasha, and Liberty Bottom, respectively. Plots at Chickasha and Martha were harvested on October 15, and on October 31 at Liberty Bottom.

Eight peanut lines were included in this study at each location. Each plot consisted of two 20-ft rows, 3-ft apart, with four replications. Incidence of southern blight and yield at the three locations are presented in Table 1. Value per acre of the peanut lines at the three locations is presented in Table 2. Limb rot and pod rot data at the three locations are presented in Table 3.

The cultivars of Tamrun 96 and Tamrun OL 01 had an average of more than 4000 lb/A over the three locations and the greatest dollar value per acre. All cultivars had grades lower than the standard cultivar, Okrun, which had a grade of 77. The lowest disease severity and incidence was recorded in the cultivar Southwest Runner; however, this cultivar was also one of the lowest yielding cultivars. The two cultivars from Georgia varied from location to location. For example Georgia Hi O/L had the highest yield in Bryan County, but had a yield significantly lower then the standard cultivar, Okrun, in Grady County. Georgia Green had the lowest yield and highest percent incidence of southern blight in Bryan County, but had one of the higher yields in Jackson County. The results of this study showed that Tamrun 96 and Tamrun OL 01 performed the best overall in these three different environments, while the Georgia cultivars varied as to location.

Incidence of Verticillium Wilt

The incidence of verticillium wilt at Chickasha was negligible during the 2002 growing season for a meaningful evaluation, and therefore, disease readings were not taken. The other two locations (Martha and Liberty Bottom) did not have history of verticillium wilt.

The verticillium wilt fungus isolate that was recovered in 2000 from diseased Okrun grown in a commercial field in Seminole, TX, got contaminated with bacteria. Efforts are under way to clean the isolate for conducting pathogenicity tests on several peanut lines under greenhouse conditions.

Table 1. Comparison of yields and percent incidence of southern blight on the advanced peanut breeding lines at three locations in Oklahoma, 2002.

Breeding Line	Yield lb/A				Percent Southern Blight			
	Bryan[1]	Grady	Jackson	Av	Bryan	Grady	Jackson	Av
Okrun	2404	3639	5273	3772	21.6	0.0	9.7	10.4
SW Runner	2849*[2]	2568*	4801	3406	1.3	0.0	0.0	0.4
Tamrun 96	3539*	4038	5236	4271	1.9	0.0	1.3	1.0
Georgia Green	1924*	2949*	5636	3503	70.3*	0.0	15.9	28.8
Tamrun 98	2577	3267	5527	3790	37.5	0.0	5.0	14.2
Tamrun OL 01	3331*	3712	5799	4280	26.0	0.0	4.1	10.0
Tamrun OL 02	3249*	3294	5109	3884	22.5	0.0	6.3	9.6
Georgia Hi OL	3603*	2841*	5236	3987	12.5	0.0	2.8	5.1
LSD 0.05	369	542	NS[3]		31.4		NS	
Pr>F	0.0001	0.0002	0.6164		0.004		0.1644	

1 Plots at Bryan County were located at the Gary Weger Farm, Liberty Bottom, OK; Grady County plots were located at the Arthur Kell farm near Chickasha, OK; and Jackson County plots were located at Phil and Matt Muller farm near Martha, OK.

2 * Breeding line mean significant from mean of the Okrun variety.

3 NS = differences in breeding lines not significant.

Table 2. Value per acre of the advanced peanut breeding lines at three locations in Oklahoma, 2002.

Breeding Line	Value/A				Grade			
	Bryan[1]	Grady	Jackson	Av	Bryan	Grady	Jackson	Av
Okrun	$464	$675	$991	$710	79	76	77	77
SW Runner	473	414	832	573	68	66	71	68
Tamrun 96	656	680	920	752	76	69	72	72
Georgia Green	352	518	1059	643	75	72	77	75
Tamrun 98	478	574	1025	692	76	72	76	75
Tamrun OL 01	610	643	1033	762	75	71	73	73
Tamrun OL 02	587	571	935	698	74	71	75	73
Georgia Hi OL	659	520	983	721	75	75	73	74

1 Plots at Bryan County were located at the Gary Weger Farm, Liberty Bottom, OK; Grady County plots were located at the Arthur Kell farm near Chickasha, OK; and Jackson County plots were located at Phil and Matt Muller farm near Martha, OK.

Table 3. Comparison of limb rot and pod rot peanut diseases on the advanced peanut breeding lines at three locations in Oklahoma, 2002.

Breeding Line	Percent Limb Rot				Percent Pod Rot			
	Bryan[1]	Grady	Jackson	Av	Bryan	Grady	Jackson	Av
Okrun	4.0	0.0	0.0	1.3	2.0	0.0	0.3	0.8
SW Runner	0.8	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Tamrun 96	4.8	0.0	0.0	1.6	0.5	0.0	2.8	1.1
Georgia Green	1.5	0.0	0.0	0.5	2.8	0.0	3.8	2.2
Tamrun 98	2.1	0.0	0.0	0.7	0.5	0.0	0.3	0.3
Tamrun OL 01	3.0	0.0	0.0	1.0	2.8	0.0	0.3	1.0
Tamrun OL 02	4.5	0.0	0.0	1.5	0.8	0.0	0.3	0.3
Georgia Hi OL	1.2	0.0	0.0	0.4	4.3	0.0	0.0	1.4
LSD 0.05				NS[2]				NS
Pr>F				0.2634				0.3531

1 Plots at Bryan County were located at the Gary Weger Farm, Liberty Bottom, OK; Grady County plots were located at the Arthur Kell farm near Chickasha, OK; and Jackson County plots were located at Phil and Matt Muller farm near Martha, OK.
2 NS = differences in breeding lines not significant.

Research on Peanut Disease: Resistance to Sclerotinia and Southern Blights in Oklahoma

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2002 progress made possible through OPC support

- Lowering the relative humidity from 100% to about 70% in the incubation chamber 24 hours after inoculation with Sclerotinia produced more realistic Sclerotinia reaction on Okrun and Southwest Runner, which mimics field evaluations.
- Calcium content in peanut shells increased by at least 30% in response to calcium application in the form of calcium sulfate (gypsum) or calcium chloride.
- A procedure for reproducing peanut pod breakdown by the southern blight fungus under greenhouse and laboratory conditions was developed.

Background

Peanuts are an important economic crop for Oklahoma. Pressure from soilborne diseases are limiting and increasing peanut production costs. Sclerotinia and southern blights are soilborne diseases that are economically important to peanut production in Oklahoma. Much progress has been made in management of sclerotinia blight through the release of several resistant peanut cultivars since 1990. Research is continuing to identify new resistant peanut breeding lines for both diseases, therefore, development of improved screening methodology under greenhouse and field conditions is needed to accelerate the development and release of additional resistant cultivars. Enhancement of calcium content in the cell walls of plants may play a role in increasing plant resistance to pectolytic and macerating enzymes produced by fungi such as the Sclerotinia and southern blight pathogens. Therefore, the effect of calcium nutrition, applied as calcium chloride, on altering Sclerotinia and southern blights disease reactions needs to be investigated in advanced peanut breeding lines under greenhouse and field conditions.

Research Objectives

1 To initiate research to determine post-inoculation physical environmental parameters under greenhouse conditions that produce Sclerotinia response in peanut lines mimicking field reaction. This research will be conducted in the greenhouse and in small field plots.
2 To initiate research to investigate the effect of applying calcium chloride, under greenhouse and field conditions, to enhance the content of calcium in the shell and kernels of several advanced peanut breeding lines.
3 To initiate studies to determine the effect of increased calcium content in the peanut shell and kernels and on the ability of Sclerotinia and southern blight pathogens to degrade peanut pods under greenhouse and field conditions.
4 To initiate studies to determine the rate of degradation of cell walls isolated from peanut shells that have normal and increased calcium content, by pectolytic and macerating enzymes produced by the Sclerotinia and southern blight fungi.

Research progress in 2002

In objective 1, research was initiated to vary post inoculation relative humidity in the incubation chambers under the greenhouse. Lowering the relative humidity from 100% to about 70% in the incubation chamber 24 hours after inoculation with Sclerotinia produced more realistic Sclerotinia reaction on Okrun and Southwest Runner, which mimics field evaluations (Tables 1 and 2).

In objective 2, greenhouse experiments were conducted to determine the effect of applying calcium on the calcium content of peanut shells and kernels. Calcium content in peanut shells increased by at least 30% in response to calcium application in the form of calcium sulfate (gypsum) or calcium chloride. Calcium content of peanut kernels did not increase in response to applying calcium. This step is necessary to research objectives 2 and 3.

In objective 3, a procedure for reproducing peanut pod breakdown by the southern blight fungus under greenhouse and laboratory conditions was developed. A manuscript describing this technique was submitted to *Peanut Science* for publication. This technique will have a wide application to study factors influencing the interaction between peanut pods and the southern blight fungus and other pod-infecting pathogens under controlled conditions. Also, this technique will facilitate progress on research objectives 3 and 4.

Table 1: Reaction parameter of *S. minor*, over post inoculation relative humidity regimes, in Okrun and Southwest runner peanut cultivars.

	Reaction parameter		
Cultivar	DI(%)[1]	LL(mm)[2]	AUDPC[3]
Okrun[4]	86 a	42.9 a	84.6 a
Southwest Runner[5]	81 a	28.9 b	56.7 b

[1] DI(%) = Disease incidence at 6 day PI
[2] LL(mm) = Length of lesion (mm) at 6 day PI
[3] AUDPC = area under disease progress curve
[4] OK = A Sclerotinia susceptible cultivar
[5] SW = A Sclerotinia resistant cultivar
Values in each reaction parameter followed by the same letter are not significantly different at P > 0.05

Table 2: Response of Okrun (OK) and Southwest runner (SW) peanut cultivars to inoculation with *S. minor* under post inoculation (PI) high and low relative humidity (RH).

		Cultivar Response Parameters		
PI Treatment		DI(%)[1]	LL(mm)[2]	AUDPC[3]
Continuous High RH	OK[4]	96 a	64.0 a	129.4 a
	SW[5]	100 a	47.5 b	93.6 b
Lower RH 24 hours PI	OK	66 a	21.9 a	39.8 a
	SW	73 a	10.4 b	19.8 b

[1] DI(%) = Disease incidence at 6 day PI
[2] LL(mm) = Length of lesion (mm) at 6 day PI
[3] AUDPC = area under disease progress curve
[4] OK = A Sclerotinia susceptible cultivar
[5] SW = A Sclerotinia resistant cultivar
Values in each reaction parameter followed by the same letter are not significantly different at P > 0.05.

Improving Resistance to Sclerotinia Blight in Four Selected Peanut Breeding Lines or Cultivars

K. E. Dashiell and J. R. Sholar, Plant and Soil Sciences
K. D. Chenault and H. A. Melouk, USDA/ARS
T. N. Douglas, MS Graduate Student, Plant and Soil Sciences

The major disease that reduces peanut yields in Oklahoma is Sclerotinia blight. Some varieties such as Southwest Runner and Tamspan 90 have been developed that have good levels of resistance, but a higher level of resistance is needed. During 2001, several transgenic lines that were developed by the USDA to have higher levels of resistance to Sclerotinia blight were field tested at Ft. Cobb. These transgenic lines were confirmed to have a higher level of resistance than Okrun, the line they were originally developed from.

The objective of this project is to develop peanut cultivars with improved levels of resistance to Sclerotinia blight. The backcross breeding procedure is being used. The transgenic parents used have been confirmed to have higher levels of resistance and relatively stable inheritance of the resistance. The recurrent parents were selected because of their good agronomic performance and because they have high oleic acid content.

The number of F_1 seeds harvested was 56 (Table 1) but only two F_1 plants were confirmed to have the gene or genes for resistance to Sclerotinia. This lack of stable inheritance associated with transgenic plants has also been reported in other crops. The two F_1 plants that have been confirmed to have the chitinase and glucanase genes are presently being backcrossed to UF00627 and TX 994336.

Table 1. The parents, number of F_1 seeds harvested, and the number of F_1 plants that were confirmed transgenic during 2002.

Parents			
Transgenic*	Recurrent	F_1 seeds Harvested	Confirmed F_1 Transgenic
654	UF 00627	2	1
654	TX 994336	6	1
654	Tamrun OL 01	2	0
87	Tamrun OL 01	6	0
87	TX 994336	6	0
87	UF 00627	11	0
87	Tamrun OL 02	3	0
540	UF 00627	4	0
540	TX 994336	10	0
540	Tamrun OL 02	6	0
Total		56	2

* 654 = OKRUN with chitinase and glucanase genes.
* 87 = OKRUN with chitinase and glucanase genes.
* 540 = OKRUN with chitinase gene.
Date Planted March 14, 2002
Date Harvested August 2002

Results of Applied Research on Peanuts

J. R. Sholar and J. K. Nickels
Department of Plant and Soil Sciences

2002 progress made possible through OPC support

- In four variety tests, runner peanut varieties averaged 1774 lb/A and 4% TSMK higher than Spanish varieties. Tamrun 96 continued to be an excellent performer and is the top performing variety that is commercially available.
- At the Eddie Repp Farm Test, ro-till (also known as strip till) produced significantly higher yields and grades than did the no-till plots. This indicates that some soil disturbance in the seeding zone is preferable to total no-till for peanuts.
- Late season nitrogen applications did not result in increased peanut yields or improve peanut grades.
- In a test to evaluate peanut variety response to several commercially available herbicides, none of the herbicides reduced peanut yield and quality, demonstrating that there is good tolerance to herbicides available to growers.
- Inoculation tests showed that new inoculants can produce higher numerical yields, but rarely are the differences statistically significant. Grades were not affected by the treatments.
- A seeding rate test demonstrated that there is no difference in yields from varying seeding rates provided an adequate amount of seed is planted.

Background

The Oklahoma and U.S. peanut continues to undergo changes. Rising production costs, disease problems, etc. have continued to result in a shift of peanuts from eastern Oklahoma to southwest Oklahoma. Five southwestern counties now account for 25% of Oklahoma's 70,000 acre peanut crop. Oklahoma's peanut acreage has dropped from 125,000 acres in 1980 to 70,000 acres planted in 2002. However, peanuts remain one of the few farm commodities offering acceptable potential for a positive return to growers. Profit margins are very narrow as costs of production have risen and prices paid to producers have remained as established by the 1996 Farm Bill. Growers must adopt innovative management strategies to remain competitive in the peanut industry. The following applied research was conducted to assist growers, so they can remain competitive in the peanut industry. The applied research in peanuts conducted by the Department of Plant and Soil Sciences focuses on the introduction and demonstration of new and appropriate technology for Oklahoma conditions. The objective is to assist growers in developing management strategies that will result in a more economical production. The importance that the peanut industry has placed on delivery of a high quality product is also a focal point.

1. Variety Tests

The purpose of the variety testing program is to evaluate the performance of new varieties and to compare that performance to varieties currently available. In 2002, variety tests were conducted in Caddo, Grady, Bryan, and Jackson counties. Sclerotinia blight was not a major problem at any of the locations in 2002.

Yields were very good at all locations. The field at Jackson County has only a very recent history of peanut production. This no doubt contributed to the extremely high yields. In this test, Tamrun OL 01 yielded 5418 lb/A.

Grades reflect the fact that the crop was set uniformly and grades were higher than in some years. The highest grade obtained was 77% TSMK for OK 8-4-10, an experimental line.

The following varieties have demonstrated the best potential for being planted in Oklahoma:

Tamrun 96 - This variety was developed by Texas A&M University and was released in 1996. It continues to be the top performing variety in Oklahoma tests. It has resistance to Tomato Spotted Wilt Virus (TSWV), a disease that to date has resulted in relatively small problems in Oklahoma. However, this disease is causing severe losses in the southeastern U.S. and in some areas of Texas.

In 2000, this variety averaged 4010 lb/A at six locations, in 2001 it averaged 4260 lb/A at six locations, and in 2002, it averaged 4892 lb/A at four locations. This variety tends to grade 1 to 2% lower than Okrun. It has consistently been the highest yielding variety in statewide variety tests con-

Peanut acreage, yield, and value.

Year	Acres Planted	Yield (lb/A)	Total Value (Millions $)
2002	70,000	2800	34
2001	85,000	2200	50
2000	84,800	1800	50
1999	85,400	2271	55
1998	89,200	2326	60.6
1997	94,200	2352	63
1996	98,400	2355	67.7
1995	103,400	2334	69.7

ducted during 1997-2001. Tamrun 96 also has demonstrated some Sclerotinia blight resistance. As an example, in the 1998 test in Bryan County under Sclerotinina blight pressure, Tamrun 96 yielded 3872 lb/A compared to 2105 lb/A for Okrun.

Georgia Green – Released by the University of Georgia, was first tested in Oklahoma variety tests in 1998. The performance of this variety was good at all locations in 1998 and 1999. Georgia Green tends to mature a little earlier and grade a little higher than Tamrun 96. In 6 tests in 2000, Georgia Green averaged 3860 lb/A while Tamrun 96 averaged 4010 lb/A. In the same tests, Georgia Green averaged 71% TSMK and Tamrun 96 averaged 69% TSMK. In 6 tests in 2001, Georgia Green averaged 4125 lb/A while Tamrun 96 averaged 4260 lb/A. In the same tests, Georgia Green averaged 72% TSMK and Tamrun 96 averaged 69% TSMK. In 2002, Georgia Green averaged 4573 lb/A with a grade of 75 at four locations.

Peanut variety tests – 2002.

	Average of Four Tests			
Variety	Market Type	Yield (lb/A)	Grade (%TSMK)	Gross Return ($/A)
Spanco	Sp	3474	70	597
OLin	Sp	2902	69	492
Tamspan 90	Sp	2906	70	502
LSD 0.05		NS	2.2	
Tamrun OL 01	Ru	5418	74	983
OK-8-4-010	Ru	5086	77	964
OK-8-4-003	Ru	5104	76	958
TX-977053	Ru	5081	71	891
Tamrun 96	Ru	4892	74	890
Okrun	Ru	4675	76	877
Georgia Hi OL	Ru	4700	74	858
Georgia Green	Ru	4573	75	851
AT 120	Ru	4283	73	769
LSD 0.05		NS	3.3	

Average of four counties (12 observations) on runner type - Bryan, Caddo, Grady, and Jackson. Average of three counties (9 observations) on Spanish type – Bryan, Caddo, and Jackson.
Cultivars are ranked by gross returns ($/A).
Average runner yield was 4868 lb/A.
Average Spanish yield was 3094 lb/A.

2. Variety X Herbicide Tests

Three herbicides were tested on four varieties at three locations in 2000, 2001, and 2002. The herbicides are listed in the table and the varieties used were Okrun, Tamrun 96, AT 120, and Tamspan 90. The purpose of the test was to determine if the varieties would respond differentially to the herbicides.

We determined that under the environmental conditions of these years, all varieties tested had good tolerance to these herbicides. In these tests, there was no variety response, as measured by yield or grade, to the different herbicides.

During 2001 in some Oklahoma peanut fields, we observed peanut injury when Valor was used as a preemerge treatment and heavy rainfall occurred during or immediately after the cracking stage of the peanuts. We attributed this injury to splashing of the herbicide onto the peanut plants. We have not experienced such environmental conditions at any of our test sites in any year and consequently have not observe this type of injury.

Variety X herbicide summary – 2000-2002.

	Average of Three Tests/Year		
Herbicide	Obs. (lb/A)	Yield (% TSMK)	Grade
Strongarm 84 WG 0.45 oz/A	96	3953	72
Valor 50 WP 3 oz/A	96	3979	72
Cadre 70 DF 1.44 oz/A	96	4082	73
Weed Free Hand Weeded	96	4018	72

Tests were conducted at:
Caddo Research Station, Caddo County.
Matt Muller Farm, Jackson County.
Gary Weger Farm, Bryan County.

3. Peanut Inoculation Tests

Peanut inoculation tests were conducted on old peanut land and all tests were irrigated. In 2002, Oklahoma crops suffered through a summer-long drought and only irrigated crops produced acceptable yields in the southwest. The Caddo County and Bryan County tests were irrigated with side-roll irrigation systems and the Jackson County test was flood irrigated.

Yields were good at all locations and the correlations of variation were low in all tests. Yields were not statistically different at two locations; however, yields at the Caddo County test were significantly greater in the inoculation treatments. Grades were not affected by the treatments. Four of the five inoculant treatments produced yields that were numerically greater than the untreated check.

Peanut inoculation tests – 2002.

Treatment	Summary of Three Tests		
	Yield (lb/A)	Grade (%TSMK)	Gross Return ($/A)
Urbana-Rhizoflo/Granular (infurrow) 5.5#/row acre	4952	75	906
Nitragin – Peanut Special (Seed Trt.) 7 oz /100# seed	4934	75	901
Urbana-Mega Prep (Seed Trt.) 4.4 oz/100# seed	4910	74	893
Nitragin – Lift Liquid (Seed Trt.) 1 oz/1000 row feet	4807	75	884
Untreated Control	4786	75	878
Nitragin – Soil Implant/Granular (infurrow) 5.6#/row acre	4659	74	844
LSD 0.05	ns	ns	ns

4. Seeding Rate Test

Growers frequently plant excessive seed in an attempt to increase peanut yields. A seeding rate demonstration was conducted to demonstrate that there is little or no difference in yield results from varying seeding rates as long as an adequate amount of seed is planted. Previous research has indicated that seeding rates of 80-90 lbs/A will produce yields equal to yields from 100 lb/A or more. The results of this applied research confirmed what had been previously determined.

Seeding rate test – 2001 and 2002
Phillip and Matt Muller Farms
Jackson County

Treatment	Yield (lb/A)	Grade (%TSMK)[1]
80 lb/A	5992	73
90 lb/A	6235	74
100 lb/A	5968	74
LSD 0.05	NS	NS

[1] % TSMK = % Total Sound Mature Kernels
Planting Date – May
Variety – Tamrun 96
Digging Date – October

5. Evaluate the Effects of Reduced Tillage on Peanut Production and Pest Management (Funded by National Peanut Board)

Background

Rising production costs and reduced income as a result of recent farm policy changes for peanuts will cause even greater pressure on peanut growers than that seen in recent years. As a result, Oklahoma growers have accelerated the adoption of minimum tillage (ro-till) and no tillage (no-till) systems as a means of reducing production costs and conserving soil resources. However, growers cannot insure no-till peanuts at the present time due to a lack of research information to justify this practice.

Several reduced tillage tests were conducted in 2002. The results will be combined with those of earlier tests to determine recommended production practices for Oklahoma peanut growers.

Research Objective and Plan of Action

1. **Measure levels of weeds, insects, and diseases in conventional and reduced tillage systems**. Field plots were established in 2002 that compared no-till, ro-till, and conventional tillage systems on a Spanish and a runner variety. Levels of leaf spot, southern and Sclerotinia blights, and limb rot

were measured in plots sprayed and not sprayed with fungicide periodically throughout the season.

2. **Determine the soilborne diseases, insects, weeds, yield, and quality responses of peanuts grown under conventional and reduced tillage systems to fungicide programs.** Plots under no-till, ro-till, and conventional tillage systems were left unsprayed, while other plots received fungicide programs for leaf spot, and leaf spot and soilborne diseases. The disease, insect, weed, yield, quality, and crop value responses to the tillage and fungicide programs were measured.

Results

This research will begin to clarify the impact of tillage systems on disease development in peanuts. By applying results of this research, growers will be able to anticipate yield losses or gains due to reduced tillage for a range of fungicide inputs for the major types of peanuts grown in Oklahoma. This research will also add to the OSU database on no-till peanut production in Oklahoma and may help growers secure crop insurance for no-till peanuts in the future. The impact of tillage practices on pests is described elsewhere in this document. The effects on peanut yields and quality are indicated below. In summary, at the Eddie Repp Farm Test, ro-till (also known as strip till) produced significantly higher yield and grade than did the no-till plots. This indicates that some soil disturbance in the seeding zone is preferable to total no-till. This supports results of previous research we have conducted. At the Crop Guard Farm location, the conventional till treatment yielded significantly more than either the no-till or ro-till treatments. This soil was more variable than the Repp location and tillage was more beneficial here. This also supports previous findings.

Tillage test – 2002
Eddie Repp Farm
Caddo County

Tillage System	Yield (lb/A)	Grade (%TSMK)	Gross Returns ($/A)
Ro-till	5324	75	987
No-till	4864	73	874
LSD 0.05	243	0.6	50

Peanut tillage test – 2002
Eddie Repp Farm
Caddo County

Tillage System	Herbicide[1]	Yield (lb/A)	Grade (%TSMK)[2]	Gross Return ($/A)
Ro-till		5324	75	987
	Strongarm	5435	75	1003
	Valor	5041	76	937
	Cadre	5442	76	1014
	Weed Free	5414	77	1021
	Dual II Mag.	5255	75	975
	Pursuit	5483	75	1012
	Outlook	5338	76	989
	Dual II Mag. + Pursuit	5186	74	949
No-till		4864	73	874
	Strongarm	5061	74	927
	Valor	4944	73	892
	Cadre	4757	71	832
	Weed Free	4888	74	893
	Dual II Mag.	4605	73	826
	Pursuit	5110	73	923
	Outlook	4840	71	853
	Dual II Mag. + Pursuit	4709	73	850

[1] Standard labled herbicide rates and application methods were applied.
[2] %TSMK = % Total Sound Mature Kernels

Peanut tillage and variety test – 2002
Crop Guard Research Farm
Caddo County

Tillage System	Variety[1]	Yield (lb/A)	Grade (%TSMK)[2]	Gross Return ($/A)
Conv. Till		3540	76	662
	Tamrun 96	3555	76	663
	Tamrun OL 01	3525	77	660
Ro-Till		3079	77	580
	Tamrun 96	2921	76	545
	Tamrun OL 01	3237	77	614
No-Till		3037	75	561
	Tamrun 96	2950	75	541
	Tamrun OL 01	3125	76	581

[1] Standard Variety Tamun 96 vs New Variety Tamrun OL 01.
[2] %TSMK = % Total Sound Mature Kernels.

6. Determine Yield Response to Late Season Nitrogen Applications (Funded by National Peanut Board)

This work started in 2002 and should be continued in 2003 to get full advantage of lessons learned. We will measure peanut yield and quality as a function of nitrogen applied during late season. Field plots will be established at six locations. The practice of applying nitrogen to peanuts continues to be a controversial issue in Oklahoma and other states. Since peanuts are a leguminous plant, well-nodulated plants are generally thought to produce an adequate amount of nitrogen for the crop. However, some research continues to show advantages for nitrogen applications during the growing season. Some growers are using high rates of nitrogen in late season with the belief that yields will be boosted. The benefits of this practice have not been verified by research. Replicated research is needed to determine if this practice is beneficial. Nitrogen applications were made at either 106 days after planting or 120 days after planting. Nitrogen was applied as urea (46-0-0) and amounts shown were the pounds of actual nitrogen used per acre.

Results

Late season nitrogen applications did not result in increased peanut yields or improve peanut grades. Additional research is required.

Peanut fertilization test – 2002
Caddo County
(Summary of Six Tests)

Treatment	Yield (lb/A)	Grade (%TSMK)[1]	Gross Return ($/A)
Untreated Control	4461	73	800
30[2] lbs/A N[3] @ 106 DAP	4561	74	827
50 lbs/A N @ 106 DAP	4587	74	831
100 lbs/A N @ 106 DAP	4775	73	861
150 lbs/A N @ 106 DAP	4419	72	788
200 lbs/A N @ 106 DAP	4476	73	803
LSD 0.05	ns	0.7	ns

[1] % TSMK = % Total Sound Mature Kernels
[2] Amounts shown are pounds of actual N per acre.
[3] N was applied as Urea (46-0-0).
Average Yield – 4557 lbs/A

Peanut fertilization test – 2002
Eddie Repp Farms
Caddo County

Treatment	Yield (lb/A)	Grade (%TSMK)[1]	Gross Return ($/A)
Untreated Control	4895	72	876
30 lbs/A N[2] @ 106 DAP	5190	76	968
50 lbs/A N @ 106 DAP	4978	76	925
100 lbs/A N @ 106 DAP	4923	77	926
150 lbs/A N @ 106 DAP	4858	76	905
200 lbs/A N @ 106 DAP	4997	75	926
30 lbs/A N @ 120 DAP	5153	75	953
50 lbs/A N @ 120 DAP	4858	75	895
LSD 0.05	ns	1.6	ns

[1] % TSMK = % Total Sound Mature Kernels
[2] N = Urea (46-0-0)
Nitrogen was applied as urea (46-0-0) and amounts shown were the pounds of actual nitrogen used per acre.
Average Yield – 4982 lbs/A

Peanut fertilization test – 2002
John Clay Farm 1
Caddo County

Treatment	Yield (lb/A)	Grade (%TSMK)[1]	Gross Return ($/A)
Untreated Control	4465	74	806
30 lbs/A N[2] @ 106 DAP	3899	73	698
50 lbs/A N @ 106 DAP	4153	74	747
100 lbs/A N @ 106 DAP	4233	73	759
150 lbs/A N @ 106 DAP	4305	73	766
200 lbs/A N @ 106 DAP	4160	72	736
30 lbs/A N @ 120 DAP	3753	73	669
50 lbs/A N @ 120 DAP	4131	73	737
LSD 0.05	ns	ns	ns

[1] % TSMK = % Total Sound Mature Kernels
[2] N = Urea (46-0-0)
Nitrogen was applied as urea (46-0-0) and amounts shown were the pounds of actual nitrogen used per acre.
Average Yield – 4137 lbs/A

Peanut fertilization test – 2002
John Clay Farm 2
Caddo County

Treatment	Yield (lb/A)	Grade (%TSMK)[1]	Gross Return ($/A)
Untreated Control	4661	72	822
30 lbs/A N[2] @ 106 DAP	5111	72	914
50 lbs/A N @ 106 DAP	4908	74	888
100 lbs/A N @ 106 DAP	4995	71	880
150 lbs/A N @ 106 DAP	4908	69	836
200 lbs/A N @ 106 DAP	4646	72	823
30 lbs/A N @ 120 DAP	5009	71	875
50 lbs/A N @ 120 DAP	4995	74	907
LSD 0.05	ns	2.2	ns

[1] % TSMK = % Total Sound Mature Kernels
[2] N = Urea (46-0-0)
Nitrogen was applied as urea (46-0-0) and amounts shown were the pounds of actual nitrogen used per acre.
Average Yield – 4904 lbs/A

Peanut fertilization test – 2002
Caddo Research Station
Caddo County

Treatment	Yield (lb/A)	Grade (%TSMK)[1]	Gross Return ($/A)
Untreated Control	4385	74	794
30 lbs/A N[2] @ 106 DAP	4574	74	826
50 lbs/A N @ 106 DAP	4305	72	764
100 lbs/A N @ 106 DAP	4639	72	821
150 lbs/A N @ 106 DAP	4429	72	788
200 lbs/A N @ 106 DAP	4276	71	750
30 lbs/A N @ 120 DAP	4574	72	816
50 lbs/A N @ 120 DAP	4407	71	775
LSD 0.05	ns	1.3	ns

[1] % TSMK = % Total Sound Mature Kernels
[2] N = Urea (46-0-0)
Nitrogen was applied as urea (46-0-0) and amounts shown were the pounds of actual nitrogen used per acre.
Average Yield – 4449 lbs/A

Peanut fertilization test – 2002
Carlos Squires Farm
Caddo County

Treatment	Yield (lb/A)	Grade (%TSMK)[1]	Gross Return ($/A)
Untreated Control	4207	74	768
30 lbs/A N[2] @ 106 DAP	5119	76	952
50 lbs/A N @ 106 DAP	4635	75	852
100 lbs/A N @ 106 DAP	5157	74	945
150 lbs/A N @ 106 DAP	4077	74	741
200 lbs/A N @ 106 DAP	4728	75	874
30 lbs/A N @ 120 DAP	4598	75	849
50 lbs/A N @ 120 DAP	4691	75	862
LSD 0.05	ns	ns	ns

[1] % TSMK = % Total Sound Mature Kernels
[2] N = Urea (46-0-0)
Nitrogen was applied as urea (46-0-0) and amounts shown were the pounds of actual nitrogen used per acre.
Average Yield – 4652 lbs/A

Peanut fertilization test – 2002
Crop Guard Research Farm
Caddo County

Treatment (lb/A)	Yield (%TSMK)[1]	Grade ($/A)	Gross Return
Untreated Control	4196	72	747
30 lbs/A N[2] @ 106 DAP	3768	72	672
50 lbs/A N @ 106 DAP	4654	73	836
100 lbs/A N @ 106 DAP	4835	73	874
150 lbs/A N @ 106 DAP	3964	73	710
200 lbs/A N @ 106 DAP	4240	73	757
LSD 0.05	ns	0.6	ns

[1] % TSMK = % Total Sound Mature Kernels
[2] N = Urea (46-0-0)
Nitrogen was applied as urea (46-0-0) and amounts shown were the pounds of actual nitrogen used per acre.
Average Yield – 4276 lbs/A

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